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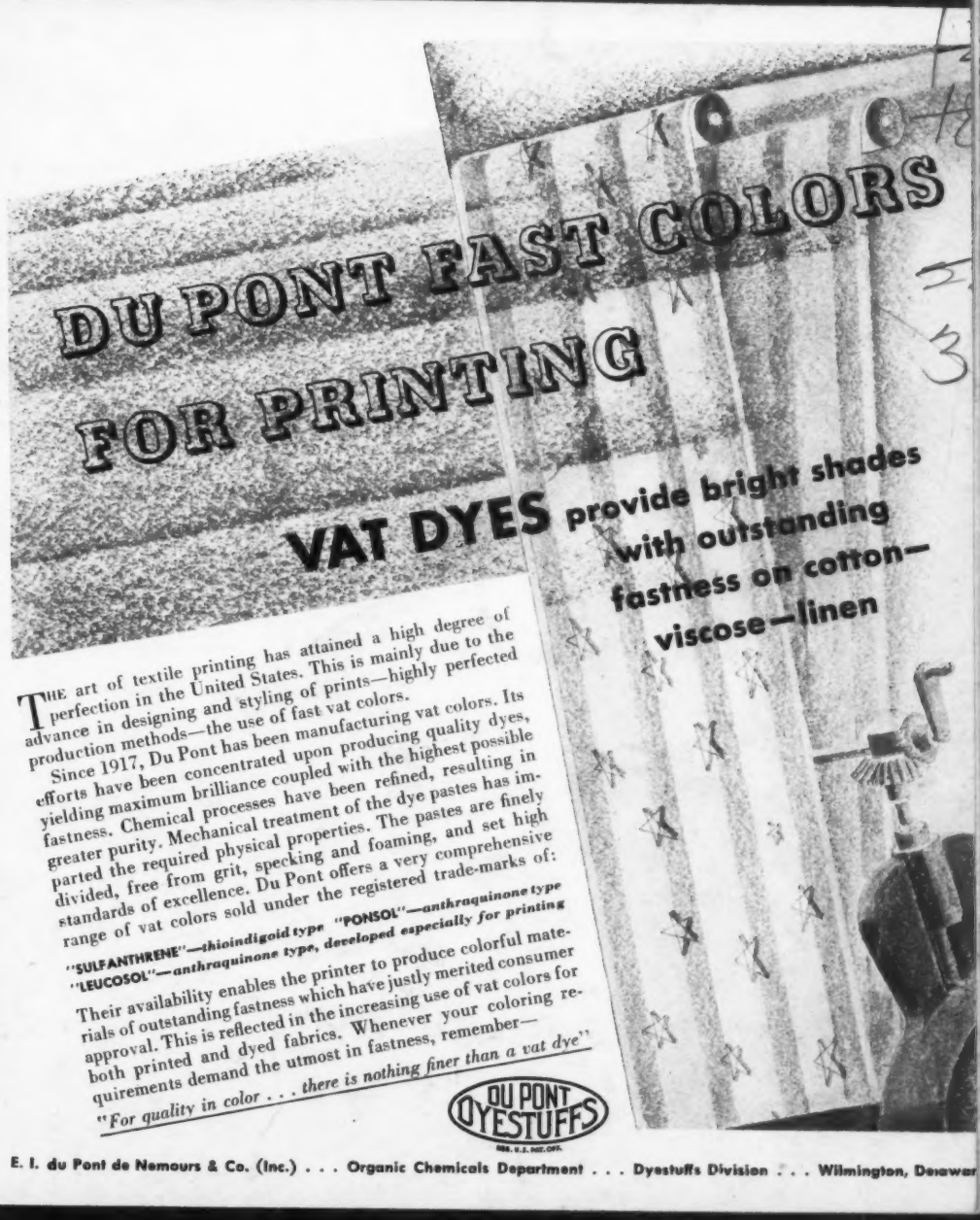

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AMERICAN
DYESTUFF REPORTER

VOLUME 29 AUGUST 19, 1940 NUMBER 17

Analysis of

Cationic Surface-Active Agents

of Trivalent Nitrogen Type*

RALPH HART**

In spite of the growing application of cationic surface-active agents in the textile and related industries as dye auxiliaries and for finishing, there seems to be a lack of published literature on methods of analysis of such compounds. In this article a procedure is outlined applicable to commercial products of the fatty acid amido-amine type. This procedure includes directions for the determination of the acid used to render the products soluble, nitrogen as alkalinity, total active ingredients or amido-amine, free fatty acids, total fatty acids, condensed amine, and uncondensed amine.

DURING the past several years there has been a growing application in the textile industry of cationic surface-active agents as dye auxiliaries and for finishing. The products on the market are either quaternary ammonium compounds or the salts of trivalent nitrogen amines. It is stated that the quaternary ammonium compounds such as octylpyridinium ammonium chloride, $C_5H_5N(C_8H_{17})Cl$, promote a fine dispersion of vat and sulfur dyes and are consequently used to attain more level dyeing with and for stripping of such dyestuffs. A rather unstable quaternary ammonium compound such as octadecyloxymethylpyridinium chloride $C_5H_5N(CH_2OC_{18}H_{37})Cl$, which upon heating in contact with cellulosic fibers combines with it, has been recommended as a permanent waterproofing treatment[3]. However, the trivalent nitrogen amine salts, particularly the salts of fatty acid amido-amines such as oleylamidoethylene-*N*-diethylamine, $C_{17}H_{33}CONHC_2H_4N(C_2H_5)_2$, have so far found the greater application. They represent the condensation products of fatty acids and di- or polyamines. Because of opposite electrical charges, these cationic agents are substantive to cotton and similar fibers and consequently are readily exhausted from the treating bath. As a finish these compounds impart to the goods desirable pliability and smoothness which are more or less permanent. By conferring a positive charge on the fabric, treated cotton goods acquire an affinity for wool dyestuffs, and by forming insoluble salts with dyes containing a sulfonic or carboxylic group, cotton goods so dyed are rendered more or less fast to washing and perspiration. These treating agents are also recommended to assist impregnation with latex and as detergents in neutral or acid baths.

The products on the market are mostly water solutions of the salts of the amines, in the form of either liquids or pastes. There seems to be little or no literature on methods of analysis of such compounds. In this paper a procedure is outlined for the chemical analysis of the trivalent nitrogen compounds of the fatty acid amido-amine type. These methods consist essentially of isolating the amido-amine, hydrolyzing it into its fatty acids and amine constituents, and determining the last two. These methods with some modification may be applied to certain sulfonated detergents of the fatty acid-amide type and possibly also to nylon[1], the new synthetic yarn, which is a polymer of the condensation product of a dicarboxylic acid and a diamine.

PROCEDURE

Acidity of Amido-Amine Salts. Enough of the sample to yield about 3 grams of the amido-amine is dissolved in 100 ml. of neutral alcohol in a 250-ml. beaker and the acidity determined by titrating with 0.5 *N* sodium hydroxide solution until neutral to phenolphthalein. Part of the acidity may be due to free fatty acids, the acidity of which is determined later. If the sample does not dissolve entirely in hot alcohol, the insoluble matter may represent filler such as dextrin, which is often incorporated in commercial cationic agents. In such cases the insoluble material is filtered off, before titrating, on a tared filter paper and dried to constant weight.

Amido-Amine. The titrated solution is transferred to a 500-ml. separatory funnel, containing 100 ml. of a saturated sodium chloride solution and 100 ml. of ether. Solid

*Analytical Edition, Ind. & Eng. Chem., July 15, 1940.
**The Hart Products Corp., 1440 Broadway, New York, N. Y.

salt is added if necessary until there is a slight excess and the mixture is thoroughly shaken. The contents are allowed to separate well and the lower layer is withdrawn into another separatory funnel. The solvent layer may be contaminated with water-soluble simple amines and inorganic salts such as sodium acetate, more or less soluble in the solvent. It is therefore washed two or more times with 25-ml. portions of the salt solution or until neutral to methyl orange. The wash waters are combined and extracted with two 35-ml. portions of a mixture of equal parts of alcohol and ether. The solvent layers from the washes are combined and, after washing with 25-ml. portions of salt solution until neutral to methyl orange, are added to the first extract. The wash waters contain the acid component of the sample, the acidity of which has already been obtained. The acid may be further identified by a steam distillation of the combined washes in the presence of excess phosphoric acid and testing the distillate in the usual manner.

The well-settled solvent layer is evaporated and the residue heated to constant weight at 110° to 115° C. The residue may be contaminated by inorganic salts varying from a trace to about 2.0 per cent. It is therefore ignited and the ash is deducted from the residue. If the ash, which consists mostly if not entirely of sodium chloride, is definitely alkaline, it shows the presence of sodium carbonate due either to alkaline salts such as sodium acetate which have not been completely washed out from the solvent layer or to uncondensed fatty acids which would be present as soda soap in the residue. The correction of the ash, which may be readily calculated, is practically insignificant and may be disregarded. The ash is retained for the determination of free fatty acids in the sample, as outlined below.

In order to obtain a supply of the amido-amine for the subsequent tests, enough of the sample to yield approximately 10 grams of the amido-amine is dissolved in 500 ml. of equal parts of ether and alcohol, the contents are neutralized with dilute sodium hydroxide until neutral to phenolphthalein, the lower layer after settling is discarded, and the solvent layer is washed with salt solution until it is neutral to methyl orange. To remove most of the salt contaminant, the solvent layer is evaporated to dryness, and the residue is dissolved in hot alcohol, filtered, and diluted wtih alcohol to about 500 ml. The concentration of the amido-amine solution is then determined by evaporating exactly 100 ml., heating the residue to constant weight, and igniting.

The tests that follow are made on aliquot portions of this solution. Tests that may be made on the amido-amine besides total nitrogen are: specific gravity, solidification point, iodine number, acetyl value, molecular weight, etc.

Free Fatty Acids. The ash from the amido-amine determination is dissolved in water and titrated hot with acid to methyl orange. From the alkalinity of the ash, the probable acid number of the original fatty acids, and the weight of the corrected amido-amine, the approximate percentage of free fatty acids may be calculated. There is a possibility that in the presence of coconut oil fatty acids, some of the soap might be soluble in the concentrated salt solution. In that case the salt solution after extracting the amido-amine should be acidified and the fatty acids extracted with ether. However, this phase was not experimentally investigated.

Nitrogen as Alkalinity. To exactly 100 ml. of the alcoholic solution of the amido-amine in a separatory flask are added 100 ml. of ether, 100 ml. of saturated salt solution, methyl orange indicator, and a measured quantity of 0.5 *N* hydrochloric acid until the lower layer, after vigorous shaking and settling, is strongly pink (about 2-ml. excess). Some excess salt is added, the contents are allowed to settle for about 15 minutes, and the clear lower layer is drawn off. The solvent layer at this stage may sometimes turn turbid and even show a precipitate, which settles in the interface, owing to the limited solubility of the amido-amine hydrochloride in the solvent. The precipitate, if any, is retained in the solvent layer. The solvent layer is washed with 25-ml. portions of salt solution until the last wash requires 0.1 to 0.15 ml. of 0.5 *N* sodium hydroxide solution to discharge the pink color due to methyl orange. The combined wash waters are then titrated for excess hydrochloric acid. The alkalinity of the sample is given by the net amount of hydrochloric acid used. The solvent layer is retained for the determination of total nitrogen.

Total Nitrogen. The solvent layer from the alkalinity test is transferred to a Kjeldahl flask, the solvent evaporated, and the nitrogen determined in the usual way.

Total Fatty Acids. Exactly 250 ml. of the alcoholic solution of the amido-amine are introduced into a 500-ml. round-bottomed flask, the solvent is evaporated, 200 ml. of 6 *N* hydrochloric acid solution and some pumice stone are added, and the contents are boiled vigorously under a water-cooled condenser for about 20 hours, or until a clear oil layer separates on the surface. After cooling, the contents are transferred to a 500-ml. separatory funnel, the flask is rinsed with about 25 ml. of hot alcohol, and the fatty acids are extracted with 100 ml. of ether. The layers are allowed to separate well, and the water layer is transferred to another separatory funnel and extracted with two 35-ml. portions of ether, which are added to the first extract. The water layer is retained for the determination of the simple amine. The solvent in the combined ether layer is evaporated and the fatty acids are heated to constant weight at 105° to 110° C. The usual tests may be applied to the extracted fatty acids: specific gravity, melting point, iodine number, acidity, saponification value, acetyl value, etc.

Condensed Amine. The amine may be determined from the amine hydrochloride, by evaporating the water layer from the decomposition test, heating the residue to constant weight, and determining the hydrochloric acid by titration. However, it is more conveniently estimated by calculation. The amine is given by the difference between 100 per cent and the per cent of fatty acids found in the amido-amine, correction being made for the water elim-

inated during the condensation, which may be calculated from the content of amido-nitrogen. The equation for calculating the amine is as follows:

$$\%\text{ of condensed amine} = 100 - \%\text{ of fatty acids} + \frac{18}{14}(\%\text{ of total nitrogen} - \%\text{ of nitrogen as alkalinity}) \quad (1)$$

where the last item—18/14 (% of total nitrogen — % of nitrogen as alkalinity)—represents the water of condensation. The percentages are based on the purified amido-amine and not on the original sample. Where the nature of the amine is known, it may also be calculated from the total nitrogen found in the amido-amine.

To isolate the amine for identification purposes, the water layer from the decomposition step is evaporated to dryness and the residue is boiled with small portions of 0.5 *N* alcoholic potassium hydroxide until the sample is completely dissolved and the solution is barely alkaline to phenolphthalein. Care should be taken not to overneutralize; otherwise the amine will be contaminated with free potassium hydroxide, which is difficult to remove. The solution is filtered, most of the alcohol is evaporated, the residue is redissolved in a small quantity of alcohol, and filtered again, and the filtrate is evaporated on a water bath until no odor of alcohol is discernible. If necessary, it may be further purified by vacuum distillation. The amine may be tested for specific gravity, nitrogen, alkalinity, boiling point, molecular weight, etc.

Uncondensed Amine. The differencce between the nitrogen content of the original sample and of the amido-amine is a measure of the free or uncondensed amine present.

Moisture. Moisture is determined in the usual manner by a xylene distillation[2]. The specific gravity of the distillate should be made and its acidity to phenolphthalein determined, as some or all of the acid used in rendering the amido-amine soluble will be found in the distillate.

EXPERIMENTAL

Commercial samples of the condensation products of oleic acid, $CH_3(CH_2)_7CH{=}CH(CH_2)_7COOH$, and hydroxyethyl ethylenediamine, $NH_2C_2H_4NHC_2H_4OH$, sample A, and of stearic acid, $C_{17}H_{35}COOH$, and triethylenetetramine, $NH_2C_2H_4NHC_2H_4NHC_2H_4NH_2$, sample B, were purified by dissolving in a mixture of equal parts of alcohol and ether, washing with concentrated salt solution until the wash water was practically neutral to methyl orange, evaporating the solvent, and heating the residue to constant weight. Experimental work on the procedure was conducted on these two samples, corrected for the presence of salt.

Acidity of Amido-Amine Salts. Approximately 2-gram portions of sample A or B were dissolved in 100 ml. of neutral alcohol, exactly 10 ml. of 0.5 *N* solutions of hydrochloric acid, acetic acid, and formic acid, respectively, were added, and the acidity was determined by titrating with 0.5 *N* sodium hydroxide to phenolphthalein. The results expressed as milligrams of potassium hydroxide are given in Table I. Highly satisfactory results were obtained in alcohol of high concentration. On the other hand, titration in water solutions gave very low results; thus, in titrating a sample containing 285 mg. of formic acid, expressed as milligrams of potassium hydroxide, only 191 mg. were recovered.

TABLE I
Acidity of Amido-Amine Salts
(Expressed as mg. of potassium hydroxide)

	Hydrochloric Acid		*Acetic Acid*		*Formic Acid*	
	Added Mg.	*Found* Mg.	*Added* Mg.	*Found* Mg.	*Added* Mg.	*Found* Mg.
Sample A	287.3	287.3	282.5	282.7	285.1	284.7
Sample B	287.3	287.2	282.5	282.9	285.1	285.0

Amido-Amine. The total active ingredients or the amide-amine were determined according to the procedure. The results were in excellent agreement and the recovery was practically 100 per cent in each case. To determine whether or not the simple amine, with which the sample may be contaminated, would be completely removed during the washing, hydroxyethyl ethylenediamine was added to about double its weight of sample A and the active ingredients were then determined. The addition of the amine did not affect the final results.

Free Fatty Acids. If the sample contains any fatty acids not combined as amide or ester, they will be found in the form of soap in the extracted amido-amine. Attempts to wash out the soap from the residue proved unsuccessful. To determine the alkalinity of the soap in the presence of the amido-amine is impossible, since the amido-amine also reacts with the acid. However, upon ashing, the amido-amine-containing soap is converted to sodium carbonate, from the alkalinity of which and the probable acid number of the fatty acids the approximate quantity of the uncombined fatty acids may be calculated.

To test this method 0.1- to 1-gram portions of oleic acid were added to approximately 3-gram samples of sample A, which was extracted as in the procedure. The residue was then ashed and the alkalinity of the ash determined by titrating hot with 0.5 *N* hydrochloric acid until neutral to methyl orange. The results were somewhat higher than the calculated values—about 3 per cent. On the other hand, the ash of the original amido-amine of both samples contained only traces of alkalinity, showing them to be free of uncondensed fatty acids.

Nitrogen as Alkalinity and Total Nitrogen. In testing the amido-amine for alkalinity, the titration in water solutions (by adding excess acid and titrating back) was found to be incomplete, and in alcohol solution the end point was not entirely satisfactory. The titration over salt solution as outlined gives concordant results, which are believed to be accurate as shown under total fatty acids. The nitrogen as alkalinity and total nitrogen are given in Table II.

TABLE II
Nitrogen as Alkalinity and Total Nitrogen

	As Alkalinity			Total
	I %	II %	Av. %	Nitrogen %
Sample A	3.18	3.15	3.17	6.71
Sample B	2.57	2.59	2.58	6.85

Hydrolysis of Amido-Amine. Krieble and Holst[4] have

made a study of the hydrolysis of formamide, acetamide, and propionamide under the influence of high concentration of hydrochloric acid and sulfuric acid. They found that each amide has a maximum velocity of hydrolysis at one particular acid concentration. The acid concentration is not the same for different amides. Krieble and Holst also note that sulfuric acid is the better catalyst before and hydrochloric acid after the maximum velocity is reached. The maximum velocity constant, *K*, for hydrochloric acid was somewhat better than for sulfuric acid. Thus, in the case of formamide, *K* for hydrochloric acid was 1.84 at 6 molal and 1.74 for sulfuric acid at 5.0 molal. They also state that for the same acid concentration the velocity constants were about the same, even though the amide concentration varied from 0.05 to 0.8 mole.

Hopper, MacGregor, and Wilson[3] have studied the hydrolysis of certain arylamides used as dye intermediates such as 2,4-dimethoxyanilide or 2-hydroxy-3-naphthoic acid. They hydrolyzed by boiling for about 6 hours with alkalies, using either 32 grams of potassium hydroxide dissolved in 200 ml. of alcohol or 50 grams of an organic base such as ethylenediamine or mono-, di-, and triethanolamine, per 15 to 20 grams of the sample. In the present experiments, while no extensive tests were made to determine the optimum condition for hydrolysis, the following qualitative results were obtained: Little or no decomposition seems to have taken place with ethylenediamine even after boiling for 10 hours, since no fatty matter could be extracted, after acidifying the solution. Sulfuric acid because of its low volatility would interfere with the subsequent steps in the procedure. The best results were obtained with 6 *N* hydrochloric acid—12 *N* produced excessive foaming and was not practical and 1.5 *N* and 3 *N* were much slower, when judged by the time it took for the fatty matter to separate in a clear oil layer. After about 20 hours of boiling with 6 *N* hydrochloric acid, the hydrolysis was practically complete, since the extracted fatty matter showed only traces of nitrogen.

Total Fatty Acids. In extracting the fatty acids, it was found impractical to wash the solvent layer free from hydrochloric acid because of the formation of troublesome emulsions, probably due to traces of the amido-amine. However, any hydrochloric acid remaining in the solvent layer is readily volatilized upon heating the residue to constant weight, as shown by the fact that when dissolved in alcohol, the residue was neutral to phenolphthalein, and when dissolved in water and acetic acid, the test for chlorides was negative. The yields of fatty acids compared with the calculated values are given in Table III. The fatty acids were calculated by Equation 1. The condensed amine in the equation was calculated from the total nitrogen of the amido-amine and the formulas of the amines used in the condensation. The differences between the experimental results and the calculated values are evidently within the experimental error.

Equation 1 may be used to check the accuracy of the nitrogen determination as alkalinity, since all the terms may be determined experimentally. Upon substituting in the formula the results obtained for the fatty acids, condensed amine, and total nitrogen, the nitrogen as alkalinity was calculated; the results were in good agreement with the determined values.

TABLE III
Total Fatty Acids

	I	II	Av.	Calculated
	%	%	%	%
Sample A	79.8	80.0	79.9	79.62
Sample B	88.1	87.8	87.9	87.63

TABLE IV
Condensed Amine

	From Equation 1	*Based on Total Nitrogen*
	%	%
Sample A	24.7	24.9
Sample B	17.6	17.9

TABLE V
Probable Composition of Samples A and B

	Sample A		*Sample B, Mixture A*	
	Found	*Calcd.*	*Found*	*Calcd.*
	%	%	%	%
Fatty acids	79.9	80.2	87.9	87.7
Total nitrogen	6.71	6.73	6.85	6.86
Nitrogen as alkalinity	3.17	3.18	2.58	2.54

The fatty acids obtained from sample B gave the normal tests for stearic acid. The fatty acids from sample A, however, though liquid at room temperatures, gave low results—namely, iodine number of 63.5, acidity number of 177.8, and saponification value of 188.5, compared with 86, 194, and 198, respectively, for the oleic acid used in making the product. The low values may probably be attributed to the addition of hydrochloric acid to the double bond during the decomposition of the amido-amine. This phase of the problem, however, was not further investigated.

Condensed Amine. Since the nature of the amines in these samples was known, it was possible to check the amines calculated from Equation 1 against the amines calculated from the total nitrogen. The results are in good agreement, as shown in Table IV.

Probable Composition of Samples A and B. A simple calculation from the data obtained for sample A, in which, however, the possible presence of esterified diamide and the ester diamine was disregarded, indicates that the sample probably contains the following mixture:

$RCONHC_2H_4NH.C_2H_4OH$	71.4%
$RCONHC_2H_4NH.C_2H_4OOCR$	20.7%
$RCONHC_2H_4N.C_2H_4OH(OCR)$	7.9%

where R represents the oleic acid residue. In the case of sample B, the data correspond to a mixture of 40 per cent of the diamide and 60 per cent of the triamide (mixture A), although several other mixtures are possible—for example, 50 per cent of the diamide, 30 per cent of the triamide, and 20 per cent of the tetraamide. In Table V are given the fatty acids and the nitrogen contents actually found and the values calculated for the probable mixtures.

ACKNOWLEDGMENT

The writer is greatly indebted to Virginia Raison of this laboratory for assistance with the analytical work.

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•TECHNICAL NOTES FROM FOREIGN SOURCES•

A Study of Mercerization

W. Schramek and H. Thomas—Monats. Textil-Industrie 53, 157, 187, 219 and 245 (1938).—This extensive paper emphasizes the chemical conception of mercerization and covers some interesting attempts to apply studies on degree of mercerization to some of its practical problems. Tests for the so-called degree of mercerization are sometimes very useful in research although usually considered of rather limited value in ordinary practical work.

The usual technical effects of mercerizing are increases in luster, in individual fiber strength and in dyeing capacity. They depend upon changes in the external form of the fibers as very largely determined by tension; and upon an internal transformation of the cellulose of the fiber to soda cellulose which becomes hydrate cellulose upon washing instead of going back to native cellulose. This includes a change in crystal structure and without it the characteristic effects of mercerization are not obtained. The practical results are thus secondary phenomena. The "chemical" transformation and the tension are the most important factors but the properties of mercerized cotton depend also upon secondary effects and upon the characteristics of the original unmercerized material.

Hence there is no simple adequate test for degree of mercerization; and of the many methods there are only two which have real significance, that of X-ray analysis and the determination of hydrolysis number. The first is the more important and the authors attach special significance to the X-ray effect as a true measure of degree of mercerization although not necessarily a measure of its commercial value.

When cotton is treated with caustic soda at concentrations up to 9 per cent there is adsorption but no change in crystal structure. The latter begins above 9 per cent and is pronounced between 15 and 18 per cent. Again, this transformation is the most important condition for the mercerization results and only the X-ray method can demonstrate it.

In special experiments there was but slight increase in luster with caustic up to 9 per cent, a great increase above that figure, and a maximum for both luster and fiber strength at about 15 per cent which is very close to the point of maximum fiber crystal change.

The X-ray diffraction diagram of mercerized cellulose taken in relation to the diagram of the unchanged cellulose in the same sample indicates the amount of transformation and thus gives a measure of the degree of mercerization. Differences as low as 10 per cent can be detected. Also, certain characteristics of the X-ray diagram are determined by the tension during mercerizing.

As a result, defects in mercerized cotton which appear as differences in dyeing capacity and elastic properties, if caused by the mercerization proper, can be identified by the X-ray method and by it alone. It is especially emphasized that this method is unique in applying to faults caused during impregnation with caustic or by variations in tension; and it is independent of the kind and state of the goods being mercerized and of their treatment afterward.

Hydrolysis number also has a definite value as a measure of the degree of mercerization since it measures the increased chemical reactivity of mercerized cotton. A similar result can be obtained by controlled alkaline oxidation followed by determination of a copper number.

Rate of Shrinkage

In an extensive line of experiments the rate of shrinkage of a single thread was taken as a measure for the progress of the action of the caustic. Such shrinkage is determined by three things, besides variables like twist and count:

(1) The concentration of caustic, which influences the amount of transformation of the cotton.

(2) The rate of diffusion, which influences rate of penetration.

(3) The "thermohydrolytic" effect.

The term thermohydrolytic extends the chemical conception of mercerizing and means that at elevated temperatures the alkali cellulose and the caustic solution come to equilibrium at a point of less transformation of cotton to the alkali cellulose than at lower temperature because of the greater tendency to hydrolyze back if the temperature is raised.

Until the action gets beyond the stage of mere adsorption of caustic by the cotton there is but little swelling and shrinkage. Swelling increases as the chemical transformation in the fiber proceeds (apparently) up to an alkali concentration where the rate of penetration of caustic into the fiber is cut down by the increase in viscosity.

These three factors together very largely determine the courses of the shrinkage curves, of which there are 27 charts with 6 or 8 curves each. The curves and tabulated data cover the action of caustic alone and caustic containing Mercerol on raw dry yarn; and of pure caustic on kier boiled dried yarn.

These extensive curves are valuable for showing what cotton tends to do although the part of most practical interest is the action in the first minute or two. They show for example, that the rate of shrinkage increases with temperature but that the total amount decreases and, through such data, demonstrate the conditions of caustic concentration, temperature and rate of wetting which are most favorable for mercerizing.

The advantages of wetting agents in the caustic are indicated. (The fact, which may not be so well known should be kept in mind that, generally speaking, plain caustic swells wet-out cotton more quickly under mercerizing conditions than caustic with an ordinary amount of wetting agent acting on dry cotton). Wet-out material introduces complications which were not considered in

this study. Present day mercerization is almost entirely on dry raw yarn (Germany) but a wetting agent is used in the caustic.

The next step was to show the relationship between transformation indicated by the X-ray results and other properties of mercerized cotton.

It was found that the shrinkage does not follow strictly the amount of such transformation but depends upon other things. Shrinkage is proportional to the amount of swelling but swelling is dependent partly upon the sorption capacity of alkali cellulose, which is greater than that of cellulose itself. It also depends upon the electrical conductivity of the caustic solution.

Neither the rate nor amount of shrinking affords a reliable criterion for the extent of the mercerization and there is less transformation of the cellulose if shrinkage is prevented during mercerizing. It is impossible to judge by estimating or measuring luster either the degree of chemical transformation or the amount of tension used on the yarn. The X-ray method, however, can show whether defective luster is caused by lack of sufficient tension or by insufficient action of the caustic.

From a great number of comparisons it is concluded that the changes in the inner structure of the cotton fiber which are brought out by the X-ray diagrams can be accepted as measures for the technical effects of mercerization. This seems to the reviewer, to be true only to a rather limited extent. However, this point-of-view, the tying of the properties of mercerized yarn so closely to the transformations of the cellulose within the fibers, is rather novel and very interesting.

Specific data are given which are apparently intended to apply to practical mercerizing and are notably in specifying higher temperatures than have usually been considered advisable.

To get the best increase in luster when mercerizing raw yarn use 20 per cent caustic containing a wetting agent, and a temperature of 50° C. (122° F.).

At a reaction time of 2½ minutes or less the use of caustic at 18-20 per cent concentration, with a wetting agent, requires a temperature of 35 to 50° C. to obtain sufficient reaction and sufficiently uniform mercerization.

This study ends with the statement that the optimum for cotton mercerization lies at caustic concentrations of 20-25 per cent, for 2½ minutes at 38-40° C. A point not brought out is that results may be very different for yarns submitted to friction and pressure in running over rollers as compared with similar tests on yarns held stationary.

The paper brings out various unusual research points but does not present a general practical method for measuring degree of mercerization. Various tests have significance within their proper limits.

Alkaline Ageing Test for Textile Oils

In a note to the Analyst (*65*, 219) W. Garner presents a test which gives visual evidence of the undesirable end products which are likely to result from the use of unsuitable oils on textiles. It has particular reference to lubrication of wool but also a more general application.

On a three inch square of white worsted serge free from soap and oil, drop 0.1 ml. of the oil to be tested at the exact center. Then hang in an oven at 80° C. six inches above a 100 ml. dish of dilute ammonia for four hours. Then cut the piece in two through the center of the oil spot; retain one-half; scour the other half in 300 ml. of soap and ammonia at 0.2 and 0.1 per cent respectively at 40° C. Drain and scour again, then dye at the rate of 5 grams of wool to 0.04 grams Coomassie Blue RLS (I.C.I.), 10 grams Glauber's salt, and with 3 ml. of acetic acid added in three portions at 20 minute intervals. Bring to the boil in 20 minutes and boil for one hour.

The original article lists a few examples of discoloration and resist effects in the dyeing. Nilox ester oil turned brownish and did not resist. Olive oil developed a pale yellow and resisted very slightly. Olive oil containing iron showed a little more reaction; peanut a little more yet; and cottonseed still more. As an extreme example linseed oil developed a brownish-yellow discoloration and showed a great resist effect.

The discoloration from the alkaline ageing appears due partly to brownish alkali salts of oxy-acids and partly to yellowish dimers and polymers from oxydation and condensation. The depth of color increases with unsaturation of the oil, amount of oxy-acids present, and the amount of effective catalyst.

Colored products due to oxy-acids scour out easily and do not resist in dyeing. The resist effect is the more significant indication of unsuitability. An oil that produces a greater resist effect than a good olive oil is considered unsuitable for textile use. An oil which has less than this "standard" resist effect may not necessarily be suitable as it may have some other defect.

(Coomassie Blue RLS was not found in the Colour Index but can no doubt be readily substituted with a color which dyes similarly).

Tests For Aniline Vapor

Traces of aniline do not have an objectionable odor but they are dangerous in the atmosphere. They may be found in the air of printworks, aniline black dyehouses, mixing rooms, and store rooms as well as in dye manufacturing plants.

There are various familiar indications of aniline if present in the air even in very small amounts. Fresh pine wood, especially shavings, turns yellow while knots slowly become black. Bleached cotton or books and papers may slowly become yellow or pink.

The (British) Department of Scientific and Industrial Research has recently investigated aniline poisoning. Acute cases may arise from splashing on the skin and clothing and subsequent absorption through the skin or breathing of the vapors.

(Continued on page 430)

PROCEEDINGS OF THE
American Association of Textile Chemists and Colorists

AUGUST 19, 1940

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• CALENDAR • OF COMING EVENTS

Meeting, Southeastern Section, Civic Room, Hotel Ralston, Columbus, Ga., September 21st, 1940. Speaker: W. D. Anderson, president of Bibb Manufacturing Co., Macon, Ga. There will also be a technical paper, the subject of which will be announced later.

Annual Meeting and Convention, auspices New York Section, October 18th and 19th, 1940, Hotel Commodore, New York City

Meeting, Piedmont Section, Carolina Hotel, Pinehurst, N. C., November 1 and 2, 1940

LAPEL BUTTONS

These buttons, bearing the seal of the Association, can be purchased by members in good standing from the Secretary at $1.50 each.

Bibliography

on Flameproofing of Textiles*

EMILY WILLIAMS AKIN,[1] PROF. LILLY H. SPENCER,[2] and DR. A. R. MACORMAC[3]

INTRODUCTION

THIS bibliography contains publications dealing principally with flameproofing of textile fabrics. Publications dealing with flameproofing of other materials have been included only when there was an indication of their adaptability to textile fabrics. It has been necessary to exercise personal judgment in the length of the abstracts used but none have been excluded because of the doubtful validity of the data given. The chief sources were Chemical Abstracts, The Abstracts Journal of Textile Institute, and Bulletins from the National Bureau of Standards. In most cases abstracts were taken directly from Chemical Abstracts or The Abstracts, Journal of Textile Institute.

This bibliography has been compiled as part of a thesis on "Methods of Testing of Flameproof Fabrics."

[1]Candidate for M.S. in Home Economics, A.P.I.
[2]Associate Professor of Home Economics, A.P.I.
[3]Associate Professor of Textile Chemistry, A.P.I.
*Contribution from the Sub-Committee on Flame Proofing, Dr. A. R. Macormac, Chairman.

TESTING OF FLAMEPROOFING

1.—Effect of Certain Fireproofing Solutions on Cotton Fabrics.

R. L. Sibley, *J. Ind. Eng. Chem. 13,* 676-7 (1921). *Chem. Abs. 15,* 3556 (1921). Seven different fireproofing solutions were tested upon tire fabric and after drying the breaking strength of each sample was determined. The alum and Na_2CO_3 treatment tendered the fabric so that it was easily torn by the fingers. $Na_2B_4O_7$ with NH_4Cl, $MgSO_4$ or glucose tendered the fabric from about 20 to 45 per cent. A 15 per cent solution of sodium tungstate slightly weakened heavy fabrics and slightly strengthened light fabrics. A 3.5 per cent solution of sodium tungstate was found to have the least weakening action and is therefore recommended.

2.—The Action of Fireproofing Solutions on Cotton.

Gustav Durst. *Textilber. 3,* 228-9 (1922). *Chem. Abs. 16,* 4354 (1922). The work of Sibley (C. A. *15,* 3556) is criticized in the following particulars: the breaking strength tests are not sufficiently accurate to justify their use in drawing conclusions concerning the relative merits of the solutions used; and, in practice, it is not customary to boil cotton fabrics for prolonged periods in acid solutions. Since acid substances or those which can form acids by hydrolysis can cause deterioration in storage or during use, they should be used with caution. NH_4 salts are likely to give trouble in this way.

3.—The Fireproofing of Fabrics.

F. I. Sadov and P. V. Sterlov. *Za Rekonstruktziyu Textil. Prom. 11,* 31-51 (1932); *Chimie & Industrie 28,* 668-9; *Chem. Abs. 26,* 6145 (1932). The following fireproofing agents were tested; Sn salts, Zn salts, waterglass, AS salts and various mixtures of these substances. After impregnation, fixation was effected by means of phosphates, borates, sulfates or NH_4 salts. The best results were obtained by the following procedures: (1) impregnation with waterglass and fixation with NH_4 chloride, sulfate or phosphate; (2) impregnation with Na stannate and fixation with NH_4 phosphate. None of these give absolute protection, but on the whole the resistance to fire is increased 3- or 4-fold. The chief drawback of all these fireproofing agents is that they are easily removed by soaking in water for 24 hours. Attempts to produce a protective surface layer by adding to the impregnating bath casein, dextrin, starch, gelatin, algin, cellulose acetate, triphenyl phosphate or finely divided asbestos, have so far been unsuccessful. Tests on the metallization of the fabric by electrolysis of $ZnSO_4$ and $CuSO_4$ solutions have not proceeded sufficiently far to warrant drawing any conclusions. Recommended test: a strip 20 cm. long is folded into four and placed on a wooden board with half the length hanging over. On bringing a Bunsen burner near the strip, burning should not extend to the board and the part on the board should not char in five minutes. A strip soaked in benzine should not burn or glow after the benzine has burnt away.

4.—Fireproofing Fabrics with Mixtures of Boric Acid and Borax.

R. Clarence. *Tiba 14,* 405-9 (1936); *Chem. Abs. 30,* 7350 (1936). A study of the degree of incombustibility attainable with mixtures of H_3BO_3 and $Na_2B_4O_7$ and of the effects of such treatments on the strength of the fabrics. Best results are obtained by applying about 6 per cent of a mixture containing 30-50 per cent of H_3BO_3. No appreciable loss in strength is produced by this treatment, provided the temperature on drying does not exceed 100°. At higher temperatures the loss in strength produced by H_3BO_3-$Na_2B_4O_7$ mixtures is nearly always less than that produced by the same quantity of either constituent alone.

5.—Methods Used at the Office National des Recherches et Inventions for Testing Fireproofed and Fireproofing Products.

Ch. Quillard. *Rech. et Inventions 17,* 95-7 (1937). *Chem. Abs. 31* 5477 (1937). An outline of the tests used. An apparatus is described which permits comparison of the degree of incombustibility of different samples of fireproofed fabrics.

6.——The Testing of Flame Resistance of Textiles.

Gustav Durst. *Melliand Textilbericht. 18,* 824 (1937); *Chem. Abs. 32,* 362 (1938); *J. Textile Inst. 29,* A41 (1938). Stripes 5 x 100 cm. are used, marked each 10 cm. The stripes are held vertically by 2 clamps at the 50- and 100-cm. marks, the 0 mark is 2 cm. above the tip of the Bunsen burner,

the flame of which as adjusted to a length of 10 cm. A thermometer, the bulb of which is at the 30-cm. mark, should read 85°. The results are given in cm. lengths of the stripes carbonized. A second test method stimulating ignition by flying cinders.

7.—Flameproofing of Textiles.
LC 467, Dept. of Commerce, National Bureau of Standards. Principles of flameproofing, researches, formulas and processes are discussed. The following tests are described: (1) Whipple and Fay; (2) Ramsbottom and Snaod; (3) National Bureau of Standards; (a) Match-Flame Ignition Test, (b) Horizontal Rate-of-Burning Test, (c) Vertical Rate-of-Burning Test.

8.—Flameproofing of Textiles.
Report of Committee on Fireproofing and Preservative Treatments. 1938. National Fire Protection Association. Recommended requirements for flameproofing of textiles. Fabrics for decorative purposes. Most treatment not resistant to leaching with water or dry cleaning. General requirements: Materials not harmful to skin; not cause objectionable changes in appearance. Flameproofing requirements: Shall not continue flaming for more than 2 seconds after test flame is removed; char average not to exceed 2½ in. Method of testing: Flame test—12 in. length is exposed, suspended ¼ in. above Bunsen or Tirill gas burner, ⅜ in. inside diameter, air supply shut off, flame 1½ in. long. Flame applied 12 seconds. Ten samples used. Test samples from 3 places in fabric. Tests by several methods, each given: (1) National Bureau of Standards Vertical Burning Test; (2) Underwriters' Laboratories Flammability Test; (3) Freeman Stove Pipe Test; Modified Freeman Test; (4) Whipple-Fay test; (5) British Sandards Test; (6) Fold Test. Results in table.

9.—Testing Flameproof Fabrics.
Ernest F. Hartman, R. Hicks and Frederick Hartman. *Fire Eng. 92,* 336-9 (1939). *Chem. Abs. 33,* 8017 (1939). Tests were made of (1) Commercial "flameproof" fabrics which had been finished and were ready for use, (2) fabrics which were wetted with a solution of a commercial flameproofing salt, wrung hand dry, dried at room temperature and ironed, (3) fabrics which were wetted with a solution of 70 per cent borax and 30 per cent boric acid, dried and ironed. Observations were made of the flashing flame during the application of the igniting agent, flame after removal of the igniting agent, char, glow and the permanency or lasting qualities of the treatment. Details are given for testing the durability of the flameproofing treatment, for conducting flame tests and for determining the proper temperature for the igniting flame. Certain rayons and light cottons are highly retentive of any salt used as a fire retardant. The only material which could not be flameproofed was a type of synthetic silk which had been "filled." Light materials tend to char over a greater area than do heavy materials. The charred area is considered a resultant and not a factor in flame spread. Heavy materials, especially those having a nap, tend to glow longer. Flashing occurred in less than 1 per cent of the specimens. Among the recommended requirements are: No flashing shall occur, the average continuation of glow at the edge of the charred area shall not exceed an additional 20 seconds after the cessation of flaming.

ORGANIC COMPOUNDS, FLAMEPROOFING BY

10.—Cellulose Acetate: Fireproofing.
A. Echengrun, E. P. 243,350. *J. Textile Inst. 17,* A109 (1926). Artificial silk is prepared from solutions of acetone-soluble cellulose acetate, or from mixtures of acetone- and chloroform-soluble cellulose acetates which have been prepared with the addition of methylene chloride. This lowers the flash point.

11.—Waterproof and Fire-resistant Sizing.
F. S. Vivas. U. S. 1,612,675. *Chem. Abs. 21,* 631 (1927). A sizing for material is formed of an organic adhesive and a substance which acts to render the organic adhesive insoluble when dry.

12.—Tribromoaniline and Its Derivatives.
H. Dreyfus. Fr. 692,370. *Chem. Abs. 25,* 1384 (1931). The acyl derivatives or 2,4,6—Tribromoaniline are used.

13.—Dichloronaphthalene Fireproofing Agent.
I. G. Farbenindustrie, E. P. 370,511. *J. Textile Inst. 23,* A501 (1932). Dichloronaphthalene is used after metallic salts.

14.—Fireproofing.
I. G. Farbenind. Ger. 532,578. *Chem. Abs. 26,* 569 (1932). Combustible material is impregnated with combustion-preventing salts dissolved in solutions of urea—CH_2O condensation products.

15.—Use of Trichloroacetamide as a Fireproofing Agent with Cellulose Acetate.
Stewart J. Carroll. U. S. 1,870,556. *Chem. Abs. 26,* 5754 (1932).

16.—Waterproofing and Fire-retarding Compositions Suitable for Use on Textile Materials.
Charles F. Booth. U. S. 1,975,072. *Chem. Abs. 28,* 7558 (1934). Chlorinated biphenyl is used together with modifying waxes and a metallic soap.

17.—Use of an Acetylated Tribromoaniline as a Fire-resister with Cellulose Acetate or Other Esters or Ethers.
Arthur J. Daly. U. S. 1,941,644. *Chem. Abs. 28,* 1861 (1934).

18.—Fireproofing and Waterproofing.
I. G. Farbenindustrie. Brit. 428,873. See Fr. 766,369. (*C. A. 29,* 2762). *Chem. Abs. 29,* 6984 (1935). Fibers are made fireproof by impregnation with a mixture of non-inflammable waxy or resinous materials and a Lake-forming substance.

19.—Fireproof Coatings.
Charles V. Deluzenne. Fr. 767,012. *Chem. Abs. 29,* 2634 (1935). The coatings are made by mixing animal glues, gelatin or other adhesives having a basis of natural or artificial glues with water and granular or fibrous filling material.

20.—Fireproofing Compositions.
Gunther Schwelder and Hans Schweitzer. Fr. 774,664. *Chem. Abs. 29,* 2268 (1935). Organic compounds of SO_2, chemically enriched in SO_2, are used in fireproof coatings. Vitrifying substances and insolubilizing substances are also added.

21.—Coated Wire Cloth.
Arthur Eichengrun. U. S. 1,985,771. *Chem. Abs. 29,* 1182 (1935). Organic derivatives of cellulose are used together with tribromoethyl or trichlorobutyl phosphate to form a "flame-proof" coating.

22.—Fireprocfing and Waterproofing Fibrous Materials.
Brit. 446,379. *Chem. Abs. 30,* 6858 (1936). Materials are rendered non-inflammable and non-hygroscopic by impregnation with an alcoholic solution of neutral or weakly acid urea phosphates and difficultly combustible natural resins.

23.—Liquid Organoderivatives of Phosphoric Acid.
Edgar C. Britton. U. S. 2,033,918. *Chem. Abs. 30,* 2988 (1936). Compounds of the general formula o-$PhC_6H_4OP(:O)YZ$, where Y represents halogen or an aryloxy group and Z represents halogen or anaryloxy group excepting the o-xenoxy group, are made by a process which involves heating a phosphorus oxyhalide to a reaction temperature with not more than twice its molecule equivalent of o-xenol or an alkali metal salt thereof.

24.—Triaryl Phosphates.
Shailer L. Bass. U. S. 2,033,916. *Chem. Abs. 30,* 2991 (1936). Triaryl phosphates of the general formula o-$ClC_6H_4RR'PO_4$, where R and R' represent aromatic radicals which may bear substituents that are substantially non-reactive toward a P oxyhalide.

25.—Fireproofing Cellulose.
Hajime Ueta. Japan 111,399. *Chem. Abs. 30,* 2382 (1936). A mixture of an alkali or an alkaline earth salt of an organic acid

and an acid is used in fireproofing cellulose, Cellophane, or celluloid.

26.—Rendering Textile Materials Flame Resistant.
Ernest R. Hanson. U. S. 2,028,715. *Chem. Abs. 30,* 1907 (1936). Cloth is treated with a material such as halogenated acenaphthene or halogenated phenanthrene which may be plasticized with a chlorinated diphenyl.

27.—Fire-resisting Hydrocarbonaceous Materials Suitable for Fibrous Materials.
James H. Young. U. S. 2,025,029. *Chem. Abs. 30,* 1158 (1936). A normally non-fluid hydrocarbonaceous material is mixed with a sufficient proportion of chlorinated biphenyl to render the composition fire-resisting.

28.—Coating Composition.
Ernest R. Hanson. Can. 368,640. *Chem. Abs. 31,* 8080 (1937). A coating composition is prepared by forming a dispersion of halogenated benzene or a halogenated hydrocarbon containing the phenanthrene group in a non-solvent liquid, and mixing with a dispersion of rubber.

29.—Fireproofing Materials.
Bayerische Stickstoff. Fr. 805,285. *Chem. Abs. 31,* 3604 (1937). The condensation products of aldehydes with compounds containing C joined to N atoms are used. Acids or their salts may be added.

30.—Fireproofing Compositions.
Gunther Schwedler and Hans Schweitzer. Ger. 639,211. *Chem. Abs. 31,* 1534 (1937). Use is made of the reaction products of SO_2 on thickened sulfite cellulose lye or like solutions of organic substances.

31.—Sulfonamides.
British Celanese and Wm. H. Moss. Brit. 455,694. *Chem. Abs. 31,* 1918 (1937). Aromatic sulfonamides containing 1 or more N-monohydroxyalkyl groups acidulated at the O atom with a COOH radical are used. Products containing a free OH group may be converted into H_3PO_4 esters to yield products having a fire-retarding action.

32.—Organic Phosphates.
Celluloid Corp. *Chem. Abs. 32,* 8626 (1938). Phosphates of cyclic OH compounds are prepared. An example is given of tritolyl phosphate. Products are useful as fire proofing agents.

33.—Treating Textiles.
Justin Pillon and Joseph Munck. Fr. 818,823. *Chem. Abs. 32,* 6078 (1938). Natural and artificial textiles are made resistant to flame by causing the condensation and polymerization, in the fibers, of products resulting from the action of proteins in the presence of an inorganic ester acting as a catalyst and as a filler for the textile.

34.—Fireproofing Coating.
Soc. Harle Freres & Co. Fr. 47,891. Addition to 802,021, (*C. A. 31,* 1534). *Chem. Abs. 32,* 4698 (1938). Tetrachloronaphthalene is replaced by other chloro derivatives of C_6H_6, $C_{10}H_8$, or Ph_2.

35.—Treatment of Cellulose Material.
Christopher Luckhaupt. Fr. 821,060. *Chem. Abs. 32,* 3611 (1938). Natural and artificial cellulose materials which are insoluble in fused terpinolhydrate are impregnated with fused terpinolhydrate.

36.—Fireproofing Solutions
Etablissements Bouillon Freres. Fr. 817,985. *Chem. Abs. 32,* 2258 (1938). A solution in water of $Al_2(SO_4)_3$ in the presence of an organic compound forming a complex is saturated with a mineral base to form a fireproofing solution.

37.—Silica Gel.
Eugene V. Hayes-Gratze. Brit. 470,699. *Chem. Abs. 32,* 1363 (1938). A silica gel suspension is made by adding a weak solution of Na silicate to a sulfonated oil and then adding a neutralized protein and an oil, paraffin, etc. Fireproofing compounds are improved by addition of the gel preparation to known proofing materials.

38.—Fireproofing Materials.
Ruhrchemie A.-G. Fr. 811,887. *Chem. Abs. 32,* 692 (1938). Material is made fireproof by treating it with a solution of dicyanodiamidine phosphate. Substances which increase the viscosity may be added to the solution.

39.—Sulfamic Acid, A New Industrial Chemical.
Martin E. Cupery. *Ind. Eng. Chem. 30,* 627-31 (1938). *Chem. Abs. 32,* 6011 (1938). Urea is dissolved in excess cold H_2SO_4. Oleum of suitable strength is added. CO_2 is evolved and HSO_3NH precipitated. Flameproofing applications indicated.

40.—Fireproofing Compositions.
W. W. Triggs. B. P. 476,043. *J. Textile Inst. 29,* A223 (1938). Materials are fireproofed by treatment with a condensation product of dicyanodiamide or a derivative thereof, with or without the addition of combustion-retarding substances such as phosphoric acid, boric acid, or hydrobromic acid.

41.—Fireproofing Solutions.
Etablissements Bouillon Freres. Fr. 48,814. *Chem. Abs. 33,* 5100 (1939). The water used in the manufacture of textiles is replaced by the fireproofing solution of organic complexes of Al_2O_3, a part of the mineral salt of Al_2O_3 of which is not completely saturated by the base used.

42.—Fire-resisting Compositions.
Frances J. Brislee, B. Wright, and L. Macfarlane. Brit. 498,181. *Chem. Abs. 33,* 4356 (1939). The compounds contain white lead, boiled linseed oil, chlorinated rubber.

43.—Fireproofing.
Marcel L. Fliniaux and Alfred B. Dumas. Fr. 833,172. *Chem. Abs. 33,* 3042 (1939). Fabrics are fireproofed by brushing, wetting, or dipping with a compound, comprising hide glue, boiling water, and K silicate.

44.—Waterproof and Fireproof Coating for Cotton and Similar Textiles.
Edwin C. Clayton and L. Heffner. Can. 378,801. *Chem. Abs. 33,* 2350 (1939). The compound comprises chlorinated organic material, water-insoluble borate, solid pigment, and a volatile solvent for the chlorinated material.

45.—Chlorinated Cellulose Fabric.
Edwin C. Clayton and L. Heffner. Can. 378,800. *Chem. Abs. 33,* 2350 (1939). A single treatment is applied of a compound containing chlorinated hydrocarbon, insoluble borate, an inorganic pigment, a loading agent and a plasticizer.

(To be concluded in next issue)

ANNUAL OUTING, NEW YORK SECTION

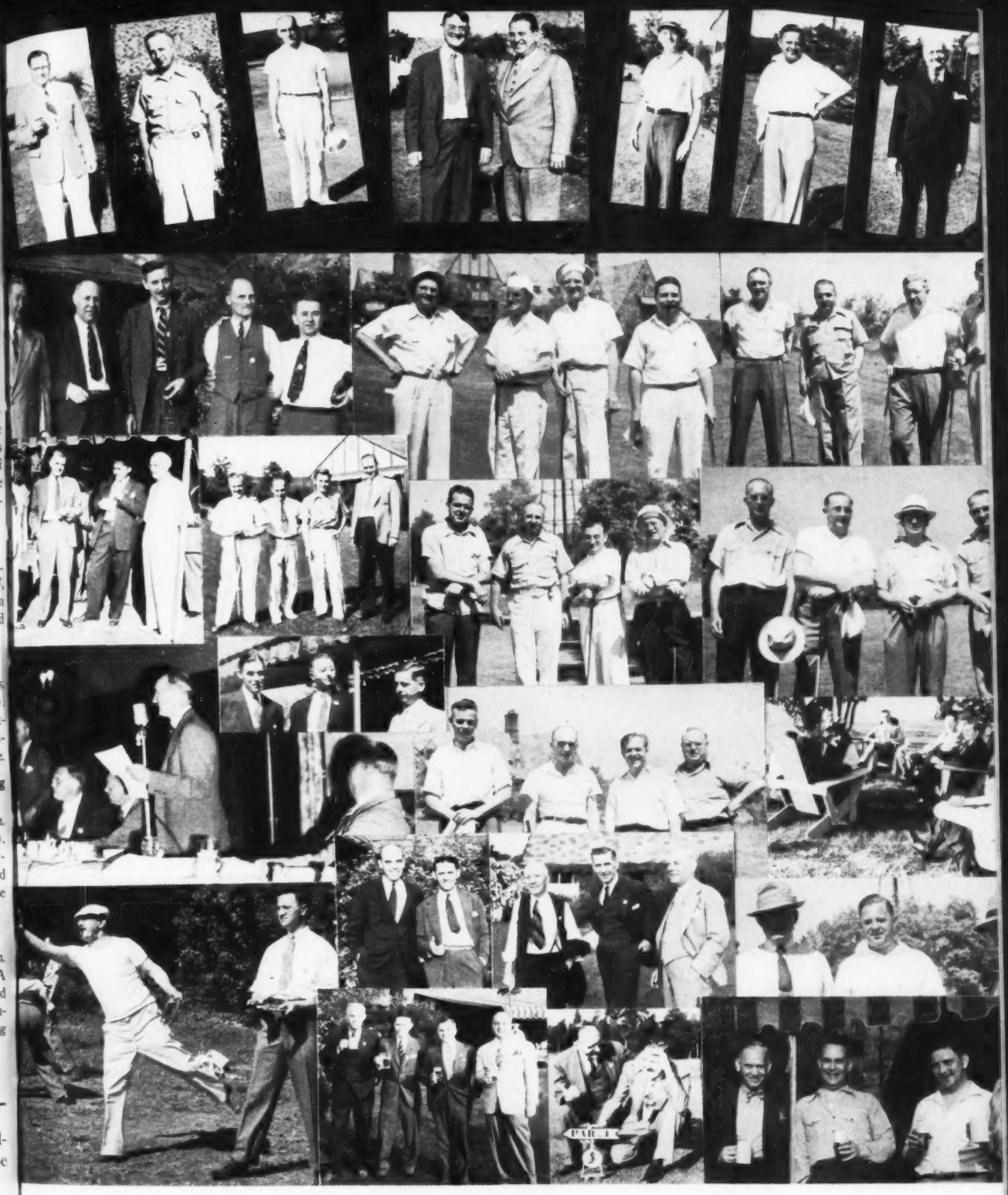
THE annual outing and golf tournament of the New York Section was held on Friday, June 7th, 1940 at the North Jersey Country Club, Paterson, N. J. As usual, this outing was an outstanding success due to the ideal weather, large attendance, numerous prizes, excellent entertainment and dinner.

There was an unusually large turnout for golf. The cup for low net was won by Milton Emerson. The adherents of other sports, such as tennis and horseshoe pitching, had a full day.

A. J. Royce, outing chairman, and his committee made every effort to provide for the comfort and entertainment of the members and their guests.

Respectfully submitted,

P. J. KENNEDY, *Secretary.*



ANNUAL OUTING, NEW YORK SECTION
NORTH JERSEY COUNTRY CLUB, JUNE 7, 1940

Photos by John J. Sokolinski and William H. Espelin

Some Recent

Fiber-Latex Developments*

M. C. TEAGUE**

IT is going to be my pleasure to tell you of some new fiber-latex developments. By that I do not mean a review of more or less known latex applications in the textile field but rather a description of recent specific progress. In doing this, however, I'm not entirely unselfish. Even among chemists, reciprocity is a good policy. Frankly I want your comments, yes, your criticism. These new developments indeed look very promising, but in order for them to serve the purpose intended, they must first withstand both a direct and cross-examination. So in a sense, ladies and gentlemen, you are the examining board.

I am going to present these witnesses briefly and factually. Then I hope you will consider yourselves as the questioning examiners and I will endeavor to answer your questions. I shall be very much interested in your comments and discussion. I am sure it will be helpful. So let us examine the first witness.

WITNESS NO. I

How would you like to sleep on a cactus plant? You're guessing at the answer, I'm not. Every night I sleep on a mattress containing a large proportion of fibers from the cactus plant. *Long ago* some one prepared fibers from leaves of the century plant and *long ago* some one brought latex from the Far East but *recently* both these fibers and the latex have been further *processed, united* and *welded*. That sounds simple but it hasn't been so simple technically. For several years, it has taken the closest cooperation between the fiber and latex experts.

Here it is in the form of a thick sheet. It is permanently resilient,—has a high fatigue resistance,—is substantially sagless,—odorless,—light in density and color,—and has further advantages over similar hair products, not to forget—a lower price.

Its manufacture has been standardized on a full production scale. Its use in mattresses and furniture is growing very rapidly and its use in some 1941 model automobiles is almost certain. These are only a few but entirely new uses for this fiber and which may mean the use of many millions of pounds. This fiber-latex product is called *"Tulatex."*

WITNESS NO. II

Here we come to fabrics, those chiefly of wool, cotton and rayon. Some of you make fabrics, others dye and finish them. May I call your attention to one problem which you have never solved? Not one of you has ever made a fabric which would look and feel like a fabric but which would not be soiled by dirty hands. Because of this negligence on your part, we've had to do something about it.

You are constantly seeking larger outlets for fabrics and in the shoe industry for your efforts you have been well repaid. Here we find ever an increasing amount of fabrics used. Many new fabrics have been developed—light and beautiful colors, interesting weaves and surface effects. But did you ever see a shoemaker with immaculately clean hands? If you did he was certainly an exception. 'Tis true that some light colored suede leathers are also easily soiled but this problem of keeping shoes clean during manufacture or cleaning them afterward to make them saleable has increased in importance many fold as the result of the greatly increased use of fabrics in shoes.

How many of you have done any experimenting with latex? Let's see your hands. Those of you who have raised your hands—have you ever gotten any latex on your clothes? If so, you know it is there to stay. After the fabric has worn out the rubber will still be there.

Yet in this problem of keeping fabric shoes clean we propose to deliberately "ruin" the fabric by spraying latex all over its outer surface—then to have the shoes made by the customary dirty hands and finally to say the secret word or go through a special daily dozen and have the latex film to easily, completely and cleanly free itself from the fabric. This problem is an old one but its commercial solution is quite new.

(Shoe sample shown here.)

I could make it sound simple by saying that we merely treat the fabric first so that the latex film will be easily removed, but that would be one of those misleading statements that express the truth but by no means the *whole truth*. Just let me enumerate some of the necessary considerations in this process. The pretreatment of these fabrics is usually acidic but it must not affect the color of the fabric. The shoe fabric is usually backed by another fabric by means of cement. Our pretreatment must not cause this cement to stain the fabric—it must not decrease the adhesion of the two fabrics. If the under fabric contains rubber threads, our pretreatment must not injure them. Our pretreatment must permit some but not too much adhesion of the subsequently applied latex rubber film.

*Presented at meeting, New York Section, April 26, 1940.

**General Development Division, United States Rubber Co.

Then as to the latex film—if it is the normal latex film it will not be satisfactory. It must be a latex processed especially for this work—it must spray satisfactorily, it must be used in the right amount, applied under the correct spraying technique, it must not stain the fabric. All of the above pretreatment considerations must be reconsidered in respect to the latex.

Much progress has been made during the past two years. This has been in the development of a satisfactory pretreatment of the fabrics of satisfactory latex preparations, improved coating and spraying technique, the solution of color and staining problems, and development of improved mechanical devices. There has resulted a satisfactory commercial use of the process in some portions of the shoe industry. For white shoes and some others, the process is now regularly used in a number of factories and hundreds of thousands of pairs of such shoes have been protected during manufacture.

And now, if you will hold in mind any questions or comments on this, I will pass on to

WITNESS NO. III

In personalizing this problem we find indeed a strange creature. Strange because it takes several forms, several objectives. This development or family of developments consists of new methods in combining rubber and textiles. You would probably not be interested in a new raincoat fabric or rubberized sheet. But I believe you will be interested in such a combination of rubber and textiles as will retain the fabric properties and are, in fact, improved fabrics.

If I may have your permission I would like to consider first some of the technical phases, and then show you some of the unusual results which may be obtained.

The types of rubber used in all cases are latex preparations which have been developed with properties appropriate for the intended uses. In other words, these latex preparations consist essentially of colloidal particles of rubber suspended in water to which have been added aqueous dispersions of other substances and some chemicals, but balancing the whole so as to have the desired stability.

The latex preparations in which we are most interested are iso-electric dispersions. Dispersions of colloidal substances generally owe their stability, that is, their inability to settle out or coagulate, to the presence of electrical charges carried by the particles of the disperse phase. There is, however, a region of hydrogen ion activity where the positive and negative charges on the dispersed particles are equal to each other and where the charges on the dispersed particles are neutralized. I suppose it might be compared with the family where the man and wife on election day neutralize each other's vote. If they were both to vote for the same ticket they would be either Democrats or Republicans, but by voting for opposing candidates this might be said to be an iso-politic family. In our solutions, the region of electrical neutrality is called the iso-electric range and particles in this range have no charge. Consequently, our iso-electric bath is composed of uncharged rubber particles and other substances suspended or dissolved in water.

Not only is this latex bath iso-electric but it is also a stable colloidal dispersion. Furthermore, by the proper use of certain chemicals, that is, protectives and surface active agents, the iso-electric pH can be shifted within wide limits so that the latex preparation can be adapted to a wide variety of operating conditions. For example, if we return to that iso-politic family—under certain conditions both members may be sour, acidic, very unhappy as they cancel each other's vote, but under more alkaline conditions, both may be happy about the whole thing. In each case the cancellation is equally effective.

When a fabric is kept in contact with such an iso-electric latex bath the dispersed particles deposit in the fabric without film formation and the bath exhausts. As in dyeing, there is a saturation limit for any given fiber. The saturation value of a fiber for the discrete particles of our latex bath depends upon the fiber itself, its cleanness, the chemicals in the bath and the time, temperature and intimacy of contact.

However, since the treating bath is stable, it cannot coagulate under the conditions of treatment and, since the bath composition is iso-electric and contains no charged particles that will be attracted by and coagulated upon the surface of an electrically charged body, the deposition of colloidal rubber particles in the fabric is non-coagulative. In other words, with respect to the fabric and the suspended rubber particles, it is not a violent case of love at first sight but rather a preliminary thorough acquaintanceship developing into a sincere affection for each other. Such a union of fabric and rubber particles we shall term "sorption" and, in this case, sorption comprises a wet set as heat is not required and as the fabric may be freely rinsed without loss of deposit.

Our new latex preparations may be applied to fabrics by spreading, immersion, padding, suction, spraying and similar technique. It is customary in different mills to use "long baths" for processing textiles, where the bath to goods ratio may be from 5:1 to 40:1. For example, I believe some silk fabrics may be dyed from a bath which is 25 times the weight of the load. Our latex baths may be used similarly, so that exhaustion of a 0.5 per cent concentration bath at 25:1 ratio should increase the weight of the silk 12½ per cent.

The question of the relative amounts of goods and bath discloses a mill difficulty. In handling fabrics which are roped, the dyeing and wet finishing steps sometime result in uneven shades and mill marks of a serious nature. These troubles may be even more serious where the treating substance is not in solution but has a definite particle size, as is true in our case. Where such troubles are encountered, we use a simple and foolproof method for processing with a low bath to goods ratio, an amount of bath less than the wet saturation of the fabric, in other words, a ratio of say ½:1 or 2:1. Suppose, for instance,

we wish to process a cut of woolen fabric to obtain an increase in weight of 15 per cent. The cut of fabric should be run in the flat through a 15 per cent concentration bath of any reasonable quantity, the fabric leaving the bath containing say seven times its weight of this bath. It should then be passed through squeeze rolls or over a suction device or extracted in a centrifugal basket to remove the excess. Leaving the removal apparatus, the fabric should contain one pound of bath per pound of fiber and this bath should exhaust upon the fiber just as in the case of the 25:1 bath. In other words, we would be using a bath to goods ratio of 1:1 by having the fabric contain all of the treating bath.

So much for the present as to the purely technical considerations. We have these new related flexible processes. How can we use them? I'll give you a few concrete examples.

Auto Fabrics

Automobile manufacturers are interested in better fabrics and cheaper fabrics. Several thousands of yards of flat automobile upholstery fabric, that is, wool fabrics but containing varying amounts of cotton, have been prepared using an iso-electric latex compound in accordance with the method which I have just described. These fabrics containing say 7½ per cent of latex solids on the weight of the fabric showed a 10 per cent gain in tensile strength and a gain in abrasion resistance of 100 per cent. A country-wide service test of about 60 automobiles upholstered with these improved fabrics confirmed that the processed fabrics had twice the life of the same but untreated fabrics.

In these service tests fabrics already being used were treated and tested. In other work, however, new fabrics were designed to show a lower net cost of the treated fabrics and as compared to the so-called standard untreated fabrics. These less expensive fabrics also showed approximately 100 per cent improvement in wear as compared to the standard untreated fabrics.

(Samples of treated and untreated automobile fabrics were shown at this point.)

Blankets

Much attention has been given to the treatment of blankets, that is, bed blankets. One hundred and sixty blankets of the institutional type, that is, of the type generally used in hospitals, have been treated so as to contain 12 per cent of the latex solids. These treated blankets showed notably 50 per cent increase in tensile strength and 50 per cent increase in resistance to abrasion. One of the most valuable findings, however, was that the treated blankets were substantially shrinkproof and did not felt. On repeated laundering these blankets showed a maximum loss of only 10 per cent in area as compared to the usual 40 per cent. And here they are. As most of you know too, blankets wear out by being cleaned, that is to say, that the fibers are only loosely held in the conventional blanket and on being cleaned many of these fibers are lost. These treated blankets, however, showed a maximum loss on repeated laundering of only 8 per cent in weight as compared to the usual 20 per cent. These treated blankets also had an improved nap, that is, instead of a long loose nap they had a short but full and uniform nap as can be noted by the samples. You may be surprised to learn also that the treated blankets had excellent resistance to the attack of moths and of this I shall have more to say later. In other words, the processing of these institutional blankets resulted in a heavier and stronger blanket which would wear longer and for its entire life would be serviceable because of being essentially shrinkproof and mothproof. All of these treated blankets along with the same but untreated ones are now in extensive service tests in a number of hospitals. Some, but less, work has been carried out on other grades of blankets and felts. We have here a plaque of treated household blankets and here is a swatch of a treated industrial felt.

Flannels and Suitings

Another type of fabric to which we have applied this process has been flannels. On these we deposited say 12 per cent of the latex solids on the weight of the fabric and which showed an increase of 10 per cent in tensile strength and about 100 per cent in resistance to abrasion. They also showed good moth repellency. We have mounted here the test pieces of a treated and untreated army serge. You will note the difference in wear resistance. Samples are contained in these small booklets showing a wide variety of woolen fabrics which have been treated. Likewise I have here one large sample of suiting and another one of top coating which have been recently treated. Suits and overcoats will be made from these fabrics and used for service tests. All of these samples you may wish to examine later.

Socks

But let me go further with the application of this process to clothing. I shall speak now of socks—cashmere socks, woolen socks and wool-cotton socks. We were very much interested in reducing the shrinkage. Several exhibits will show you the actual results better than I can tell you. Here are some cashmere socks. The shrinkage was 25 per cent and 4 per cent respectively, for those untreated and those treated. The untreated socks also felted badly. Here are some similar tests on all-wool socks. Here is a photograph of some other all-wool socks and here is an interesting photograph showing the shrinkage in socks containing varying amounts of wool. We found also that bundle goods showed a similarly reduced shrinkage.

All of these socks had 12 per cent to 20 per cent added weight due to the treatment. The shrinkage figures given represent the estimated maximum shrinkage that would occur in a prolonged and very severe laundering test. It was also established that treated socks lasted 75 per cent longer than the same but untreated socks—they were

also mothproof. Here I thought you might be interested in a few service tests on woolen socks. I have three pairs of socks which have been cross mated, one treated and one untreated and worn until one sock failed. In each case it was the untreated sock that wore out in the heel in from 16 to 30 days and in each case there was no apparent wear in the treated socks. You would like to know of course how long a pair of treated socks would wear and having this query in mind we have called in the socks from one of the service tests and I have them here for your inspection. You will note that even after 1,350 hours of wear and after 90 launderings they continue to show no wear and no appreciable shrinkage and likewise no appreciable felting. In other words, after wearing these socks approximately 15 hours every day and laundering them every day and after continuing this for three months, the wearer still has a good pair of socks. We doubt that anything approaching this has ever been accomplished before.

Underwear

Finally, may I carry this subject of wearing apparel a little further—and proceed to underwear? I have here some samples of woolen underwear fabrics. The shrinkage of these fabrics has been reduced from 20 per cent for the untreated fabric to zero for the treated fabric. This fabric has also been used to carry out our determination of mothproofness resulting from this treatment. I have here a plaque showing the attack by clothes moths and also another one showing the damage by carpet beetles on both the treated and untreated fabrics. These samples tell their own story as to mothproofness.

You may inquire as to our work in applying this treatment to other fibers. Frankly, we became so intrigued in the results of the process as applied to wool fabrics for its many uses that the work on all-cotton and all-rayon fabrics has suffered. As yet this work has only been on a laboratory scale and for that reason I haven't discussed it tonight. Somewhat more work has been carried out on silk fabrics and this with promising results.

You'll admit I'm sure that this last witness has been dressed up in many ways, almost completely with his own products. Moreover, at night he can sleep under his own shrink resistant blankets and during the day he can ride in a car trimmed with fabrics of his own make.

During the past 30 minutes or so, I've described briefly three new fiber-latex developments. The cactus fiber-latex product bids well to alter the manufacture of mattresses, furniture and automobile seats. The shoe fabric protection process is making it easier for more fabrics to be so used. A new process* has been described for improving many types of wool fabrics and the use of which probably will be extended to other fibers. I shall be very much interested in your discussion and comments.

*Covered by United States patents.

DISCUSSION

Question: Will these fibers stand dry cleaning solvents in ironing and pressing?

Dr. Teague: I think the answer is, Yes. The answer is yes definitely in respect to blankets. The answer is yes in respect to removing spots on automobile fabrics. I think the answer would be yes in each case.

Question: When these latex solutions are applied to the fabrics, is it sufficient to just dry the fabrics or do you have to vulcanize the rubber there?

Dr. Teague: We vulcanize the rubber. Rubber can be vulcanized however, under conditions which are not harmful, and not difficult in consideration of the fiber properties.

Question: Where latex solutions are applied do you have to dye the solution, too, or is the dye in the fabric sufficient to bring up the color?

Dr. Teague: The dyeing is done separately from this treatment. We do not dye at the same time that we treat these fabrics.

Question: I understand that. But the question is, Do you have to dye your rubber?

Dr. Teague: No, we do not. The rubber is there in very small particles, to a large extent, almost wholly, within the fabric. It is true that in some instances the treatment alters the shade of the untreated fabric, but by changing the dyeing we can allow for that, and match colors satisfactorily.

Mr. Benzing: In treating a skein, for instance, with this latex solution, would it be uniformally distributed on the threads?

Dr. Teague: Yes, in the threads. We have done very little work, however, in a practical mill way in applying this process to skeins.

Mr. Johan: Is your company interested in the marketing of the prepared latex solution which would be ready for addition to the water bath?

Dr. Teague: Yes; but prior to that, we would probably make some arrangements for the other companies to use the process, because there are a number of patents involved there, which should be considered.

We are not going into the wool fabric business, if that is what you have in mind. We have in mind eventually making satisfactory arrangements with fabric people for the use of this process and the latex preparation.

Mr. Herrmann: Does the process contribute any degree of water repellancy to the material?

Dr. Teague: None to speak of. The treated fiber absorbs moisture at about the same rate as the untreated. It breathes. There is no clogging of the pores to any appreciable extent, so that the treated fabrics breathe in a way comparable to the untreated fabrics.

Chairman Zisman: What about the porosity?

Dr. Teague: The porosity is substantially the same.

Mr. Dorman: On treating wool with your process, do you get a hand as you would for the woolen fabric, or do you get a hand of rubber, or rubber hand?

Dr. Teague: No, you get the hand of the woolen fabric. If you don't mind, in respect to that, I wonder if I could ask Mr. Young, who has been the one responsible for a lot of this work, if he could answer that, about the hand.

Mr. Young: We get what we say is the hand of the woolen fabric, but it is slightly modified due to the fact that we have increased the fabric in weight. The increasing of a fabric 10 per cent in weight alters the hand in the direction of a lack of drape. The fabric itself will feel more substantial. There may be a slight loss of softness.

Dr. Teague: You could form a better opinion perhaps by feeling some of these fabrics here, and notice to what extent, if any, the fabric has been changed in hand.

Question: Latex has been used as a coating material, to form a film. Is there any difference in the latex that is used or is it just the process?

Dr. Teague: It is largely the process in that case, but there are important differences in the latex itself; in other words, you can take this latex, which we have used, and you can add it on to the fabric, or coat it on to the fabric, in a manner which will give you the stiff, boardy, impermeable fabric to which you refer. But by using the process which we have, you don't get that. You don't get any substantial difference in the appearance and feel of the fabric.

To answer your question, then, it is both the latex and the process, but perhaps more largely the process.

Mr. McGuire: Does this process have any effect upon the crush-resistance of the fabric?

Dr. Teague: I would have been disappointed if somebody hadn't asked that. It is less easily crushed. We don't recommend it as a crush-resistant process, but since the fibers are locked together in many spots, it doesn't shrink, it doesn't full, and in the same manner it crushes less easily. It has more resistance to crushing. But we haven't carried it far enough to say that we would recommend it as a crush-resistant process.

UNEMPLOYMENT REGISTER

Members of this association, who are without employment, should forward to the secretary a statement as to their qualifications and experience. This information will subsequently appear on these pages with an identifying key number. Employers are also requested to file with the American Dyestuff Reporter any vacancies which may occur in their business.—H. C. Chapin, Secretary, Lowell Textile Institute, Lowell, Mass.

NOTICE TO EMPLOYERS

● ***Complete personal histories and employment records of the following applicants are on file at the office of the American Dyestuff Reporter.*** ●

Key: A—Laboratory and research; B—Dyeing or printing; C—Finishing; D—Sales; E—Instruction; F—Executive.

NOTE: PERSONS WHO HAVE OBTAINED EMPLOYMENT SHOULD NOTIFY THE SECRETARY OR THE AMERICAN DYESTUFF REPORTER AT ONCE.

A-1

Education—Graduate textile chemistry and dyeing course, Lowell Textile Institute, 1932. Special course in colloid chemistry at M.I.T.

Experience—Library work in spare time while attending school; five years as assistant chemist with knitting mill, duties consisting of testing and grading silk, testing of oils, soaps, dyes, finishes and other chemicals, making up specifications for various lines of hosiery and checking finished product, keeping a check on production costs, control of waste and irregulars, checking competing products and carrying on research to improve product and reduce costs.

Woman; age 30; references.

A-B-7

Education—Evening school in textile dyeing and chemistry.

Experience—Dyehouse laboratory for 2 years. Foreman dyer and finisher on hosiery for 9 years. Experience on ribbons also vat dyes on rayon and silk skeins. 2 years assistant to superintendent. Desires position either in demonstrating and sales or dyer; New York Viciniy. Age 33; married.

A-B-8

Education—Graduate Chemist.

Experience—Print superintendent, colorist; eleven years' experience in all types of fabrics, specializing on rayon; 8 years' dyestuff laboratory and demonstrating. Excellent references; age 37; married.

A-B-9

Education—Bradford Durfee Textile School, 1918, chemistry and dyeing course.

Experience—Dye application, textile and color chemist; good general factory, laboratory and office experience; accustomed to assuming responsibility; handled all types of help; purchased chemicals, dyes, etc.; executive ability; good personality.

Age 42; American, married; will go anywhere for interesting work; references.

A-B-10

Education—1 year of textile chemistry, day course, Philadelphia Textile School; also business course.

Experience—3 years as apprentice in weaving mill in Germany, office and stock room, general clerical work, practice in all departments of cotton manufacture, dyeing, bleaching and finishing of cotton-rayon mixtures, piece and package processing; several mos. in laboratory of German dyestuff manufacturer, dyestuffs and assistants and their application, vat and naphthol dyeing.

Age 20; will go anywhere in U. S.

A-B-11

Education: Graduate chemist. Correspond and converse German, some French.

Experience: 3 years dyer; 4 years dyestuff testing, trouble-shooting, purchasing; 4 years demonstrating, consulting, and supervising for large dyestuff manufacturer. Thoroughly experienced on rayon, cotton, silk, acetates, printing, vats. Fullest references as to character and ability. Seeks position as technician, consultant, or superintendent with reliable dyestuff sales organization or dyehouse. Age 33, married.

A-B-12

Education—Philadelphia Textile School (Evening), Chemistry and Dyeing, Quantitative and Qualitative Analysis.

Experience—Two years in yarn office, making wool stock blends. Last 6 years in dyehouse, 4 years as kettle hand, 2 years in piece dye work. Worked on yarn, raw stock and piece goods; has been dyer on union piece goods, cotton, rayon and wool, leaving wool white; also worked on all wool fabrics and woolen cross dyes; also considerable laboratory experience doing laboratory dyeings and extraction work. Seeks position as dyer or laboratory technician.

Age 30; married; references.

A-B-13

Education—B.S., Chemical Engineering, Oregon State College, 1926.

Experience—First experience in dry cleaning plant; few months as sampling and control chemist with potash and chemical company; two years in dry cleaning plant, all phases of work; few months on routine and special analyses, plant problems, special studies and research for gas and electric company; 10 years teaching experience on textile chemistry, dyeing and textile testing covering all general and special courses in this field; consultant work with various mills. Seeks position in textile chemistry or dyeing.

Age 37; married; will go anywhere; references.

A-B-14

Education—Graduate of New Bedford Textile School, chemistry and dyeing course.

Experience—Two years in dyeing filament rayon skeins; seven years general laboratory work in large print works; four years overseer of package dyeing of cotton and spun rayon with all types of colors. Plant liquidating; must find other employment

Age 34; married; references.

A-B-15

Education—Graduate chemistry, dyeing and finishing course, New Bedford Textile School, 1940.

Experience—None. Seeks position in dyeing or finishing departments or in testing (chemical, physical, microscopical).

Age 27; single; references.

A-B-C-4

Education—Educated abroad.

Experience—Twenty years experience in the textile field as bleacher, dyer, finisher and chemist. 16 years in charge of dyestuff laboratory of large dyeing plant, 4 years as chief chemist with large bleachery. Has tested dyestuffs, and chemicals used in the textile field and has manufactured soaps and textile specialties. Has handled all textile fibers; bleaching, printing, dyeing and finishing same. Has done pigment and lacquer printing, waterproofing and fireproofing. Reason for leaving last position was due to business conditions.

Age 41; married.

A-B-C-8

Education—B.T.C., 1933, Lowell Textile Institute.

Experience—5 months as rayon slasher tender; 8 months color matching, dye testing and analytical work; 5 years with large print works in rayon finishing department, laboratory, color matching, dye testing, assistant rayon dyer. Seeks position as rayon dyer, assistant dyer, or any job in a rayon dyeing and finishing plant. Age 29; single.

A-B-C-9

Education—Lowell Textile Institute; chemistry, dyeing and textile finishing.

Experience—Twelve years head dyer in hosiery mills. Dyeing all types of fibers and in combination. Knowledge of all dye applications. Matching and formula making. Charge of every department in a hosiery mill except fixing machinery. Has done jigg work on cottons and rayons. Desires position in hosiery, or in any field. Would like to work as an assistant to head dyer in a woolen or rayon mill. Age 42; married. Will go anywhere in the United States.

A-B-C-D-1

Education—Lowell Textile Institute, Bachelor of Textile Chemistry; Lowell Textile Institute (Evenings), 2 years D. C. Electricity; 2 years A. C. Electricity.

Experience—Six years as chemist and assistant dyer with a large organization. Specialized in dyeing, finishing, bleaching and drying of woolens, worsteds, cottons, rayons and unions in the piece. Some sales experience. Desires position as chemist, dyer, finisher, bleacher or sales. Age 30; American citizen; Married.

A-B-C-E-1

Education—3 years Chemical Engineer major in college; honor graduate Philadelphia Textile School, chemistry and dyeing course.

Experience—Ten years experience as chemist, colorist, technical director in bleaching, dyeing and finishing of cottons and rayons. Also one year's similar experience in South America. Instructor of textiles and textile chemistry in state vocational school, 2 years. Married; age 32; references; will go anywhere.

A-B-C-F-2

Education—Graduate, Lowell Textile Institute, 1908.

Experience—Over 30 years experience as chemist, color mixer and matcher, foreman printer, foreman dyer on all types of fibers and colors, and finisher. Experience installing complete dyeing and finishing departments. Experience as manager of dyeing and finishing companies. Experience in New York market: interviews with converters, obtaining orders, new customers, settling claims, etc.

Age 51; married, will go anywhere; references.

A-B-D-1

Education—Special courses in general chemistry.

Experience—Twenty-nine years' experience in application and standardization laboratories of various dyestuff manufacturers. Well versed in the application of dyestuffs to different textile fibers, i.e., wool, cotton, rayon, silk, acetate rayon and unions, using direct, acid, diazo, sulfur, acetate rayon, chrome and after-treated direct dyestuffs. Six months' actual dye house experience on jigs, open boxes, padders, bleaching and mercerizing. Experience demonstrating sulfur and direct colors at various mills. Seeks position as textile colorist in application laboratory and demonstrator.

Age 46; single; references.

A-D-1

Education—Graduate of New Bedford Textile School, 1936.

Experience—Chemist for woolen mill 7 months; technician and salesman for chemical company 1 year and 9 months. Seeks position as salesman or in purchasing department.

Will go anywhere; married; references.

B-6

Education—Graduate New Bedford Textile School; also post graduate work in advanced microscopy and rayon testing.

Experience—Five weeks in color shop of print works. Wants position in anything associated with textile chemistry, dyeing, finishing and testing.

Single; age 21; references.

B-7

Education—Evening course in chemistry and dyeing at Philadelphia Textile School. Evening course in chemistry at Drexel Institute.

Experience—Started as second hand in dyeworks, then two years as head dyer on women's and children's hosiery. One year as head dyer with other dye works on all types of women's hosiery including Bemberg, rayon and cotton combinations.

Age 26; married; will go anywhere in U. S.; references.

B-D-1

Education—General education in England. Chemistry and Dyeing Courses at Huddersfield Technical School.

Experience—Has been a superintendent of dyeing since 1911. Has had experience in worsted mills, hosiery mills and woolen mills. Congenial, sober and reliable. Married; references; age 53.

C-1

Experience—Thirteen years' experience in finishing all types of rayon fabrics, including spun rayons and blends. Last position also included supervision of the worsted dry finishing department. Reason for leaving last postiion: liquidation of company.

Age 39; married; will go anywhere; references.

F-1

Education—Two years high school; 6 years evening engineering school; 1 year evening textile school; 1 year industrial management; course in accounting.

Experience—Ten years in an executive capacity in full fashioned hosiery manufacturing business. Familiar with entire manufacturing procedure, finishing dept., dyehouse and office. Specialized in finishing dept. and has good eye for color, finish and quality. Had responsibility of all orders going through mill, stock, grey goods and traffic. Five months in New York sales office. Gets along well with people and contact with employees and customers has always been satisfactory. Previous to hosiery experience was in a mechanical business for 17 years.

43 years of age; single, in good health; will go anywhere.

Twentieth

ANNUAL MEETING AND CONVENTION

OCTOBER 18TH AND 19TH, 1940

HOTEL COMMODORE

NEW YORK CITY

OCTOBER 20TH, AT N.Y. WORLD'S FAIR

General Chairman

PATRICK J. KENNEDY

TECHNICAL PROGRAM

DR. WALTER M. SCOTT, chairman of the Technical Program Committee, is introducing a number of novel features. Among them are two symposiums as follows:—

"Evaluation of the Properties of Finished Textiles"

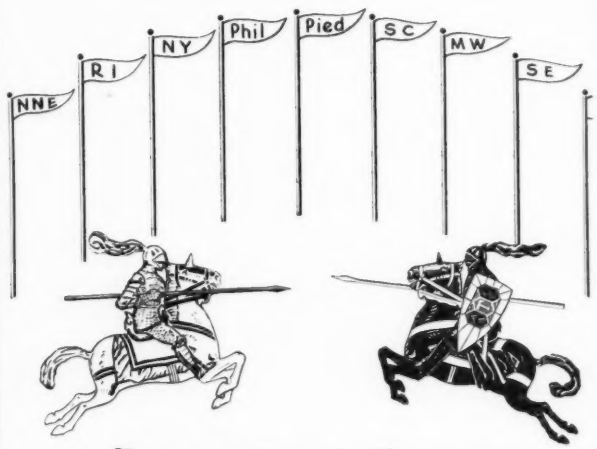
and

"Chemical Aids for the Textile Industry."

Experts will be on hand to lead the discussions and to answer questions from the floor. These timely subjects should prove of the greatest interest.

Auspices of

NEW YORK SECTION



Intersectional Contest

Titles of papers to be presented by various sections are as follows:

New York Section — "Informative Textile Labeling."

Northern New England—"What is New in New England."

Rhode Island—"The Effect of Modern Finishing Agents on the Light Fastness of Cotton Colors."

Philadelphia — "Variables Encountered in Fadeometer Testing."

Piedmont—"Screen Printing in the South."

Southeastern — "Some Observations on the Tendering of Vat and Naphthol Dyed Army Duck on Total Exposure to Weathering."

The Storage of

Mold Cultures

WM. G. CHACE*

IN laboratories where there is an occasional call for pure cultures of molds, e.g., textile laboratories, where tests for mildew-proofness must be performed at long intervals, the problem of maintaining the necessary mold cultures is a difficult one. Such cultures, if maintained in the usual way on agar slants, must be transplanted at intervals of a month or two, and if the test is used only every year or so, the cultures will probably have been neglected and be dead when they are needed.

With this problem in mind, a test of various methods of maintaining such cultures has been carried out in this laboratory during the past several years. It was found that any method using an ordinary culture medium required frequent transplantings, for it is impossible to keep the cultures so that they do not dry up and run out of nutrient.

Thom[1] states that the aspergilli may be maintained a year at temperatures just above the freezing point. The same author states that this temperature is not ideal for other genera, however. Such storage conditions as these are not usually available in testing laboratories. It was the purpose of our search to find a method which could be used by every laboratory for storage of mold cultures.

It has been our experience that two months is a maximum time for sure survival under ordinary laboratory conditions in plugged tubes on Czapek's agar. Cultures have frequently survived longer, but we have also had some losses. The conditions here more or less reproduce those in a testing laboratory, as our microbiology laboratory is surrounded on three sides by chemical laboratories, the fumes from which probably do not improve conditions for storage of cultures. These same fumes would be present in textile testing laboratories.

The first method tried was the well known one of dipping the plugs and tube tops in melted paraffin. This of course increased the length of time necessary for the slants to dry up and represented an improvement, but did not solve the problem satisfactorily.

Another method tried was that of varying the composition of the culture medium. Variations of components and variations of moisture content were tried, but results showed so little improvement over our standard modified Czapek's medium (vide Thom[2]) that the extra effort and expense of preparing the special medium made its use impractical.

After reading a popular article on the mummies of Egypt, it occurred to the author that if mold spores could live thousands of years in desiccated form in a tomb, they should be able to survive several years in that same form in a desiccator.

Cultures were planted on long slants of Czapek's agar in 8 x 1 inch culture tubes and allowed to attain heavy spore growth in a 30° C., high humidity incubator. The cultures employed were as follows:

No. 112 *Chaetomium globosum*
No. 115 *Aspergillus niger sp.*
No. 122 *Penicillium roqueforti.*
No. 123 *Aspergillus fumigatus*
No. 124 *Aspergillus glaucus*
No. 127 *Aspergillus wentii*

With the exception of the penicillium and the chaetomium these cultures all had textile origins. The *Chaetomium globosarium* was from the strain used by Thom, Humfeld, and Holman[3] in their mildew resistance test.

After the cultures had become heavily sporulated, they were transferred to a large desiccator, the base of which was filled with calcium chloride. In this, at room temperature, the cultures quickly dried up and were kept dry by storing in the desiccator. If the ratio of $CaCl_2$ to culture is large enough, the same drying medium may be used for storage as for drying. If, however, the moisture taken from the cultures causes the desiccant to cake, it should be replaced by fresh, for storage. Tubes may be taken from the desiccator, enough spores removed for subculturing, and the stock culture returned to the storage desiccator. Cotton plugs were used in the tubes throughout.

Our cultures have now been in the desiccator over three years and the spores give good typical growths on being transplanted to Czapek's agar.

This method would seem to be an answer to the problem of storing mold cultures. Such dried spore preparations would require transplanting not oftener than every three years, probably not so often, which seems reasonable even for a laboratory which uses the cultures very seldom. The method is simple and requires no unusual apparatus or little known technique. Omitting the 30° incubator should make no difference in the final result. Cultures allowed to incubate at room temperature would require longer for the formation of the heavy spore growth, otherwise the method would be the same. Cultures stored in this way are available for use as quickly as those stored on slants transplanted every two months. The author has on several occasions used such a dried spore preparation directly for

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performing the Thom test[3], although it is probably better to transplant to a slant and allow them to grow. This requires from three to five days, so the dried spore preparations will save this much time in cases of necessity.

So far no undesirable features of the method have been noticed in this laboratory. The author would be pleased to hear comments of other workers who might try the method.

References

[1]Thom: "The Aspergilli," Baltimore (1926), p. 44.
[2]Thom: ibid, p. 39.
[3]Thom, Humfeld, and Holman: Am. Dyest. Rep., 23: 581 (1934).

Note

Within a very short time, dried spore preparations of *Chaetomium globosum, A. niger, A. fumigatus,* and *A. glaucus* will be available from this laboratory at a nominal charge. Others will be added should demand arise.

• TECHNICAL NOTES FROM FOREIGN SOURCES •

(Continued from page 416)

When small amounts are present in the air the dangers are not so obvious. A concentration of only one part in 140,000 may cause slight symptoms after several hours exposure, while such amounts as one part in 6,000 to 10,000 cause a serious reaction if the atmosphere is breathed for more than an hour. Very slight concentrations may cause trouble in much longer periods of time.

The Department went particularly into the subject of tests. First, some of the air is bubbled through a dilute solution of hydrochloric acid which takes out the aniline as aniline hydrochloride. Ordinary tests may not be sensitive enough for practical use. The most familiar is to add a few drops of dilute solution of bleaching powder to the solution containing hydrochloride. This gives a purple coloration changing to a dirty red.

Since the result of the test just given may be almost imperceptible from low aniline concentrations, a more sensitive modification has been developed. After the addition of the bleaching powder reagent the solution is made alkaline with ammonia and a dilute solution of phenol in water added. A permanent deep blue color will then appear even with very slight amounts of aniline.

This test has been standardized and made quantitative by means of color standards. Details can be found in Leaflet No. 11 by the Department in the series on detection of toxic gases. Normally such publications are readily obtainable from H. M. Stationery Office in London.

The Destruction and Formation of Dyestuffs by Action of Light

(*A. Seyewetz—R. G. Mat. Col.,* 517-45, *Feb.,* 1940).—When fibers are lightly dyed with fugitive colors and exposed to the action of light, in a short time complete decolorization ensues. As the dyeing is increased in depth, color stability is markedly augmented, the products of decomposition of the dyes appearing to serve as stabilizers against the fading action of light. If paper tinted with such dyes as Diamine Pure Blue or Chrysoidine is exposed until completely faded and then retinted with the same dye to the original shade, fading on subsequent exposure to light is much slower in the second case than it was in the first. The same dyes may be equally stabilized if the paper is first impregnated with the products formed by treating solutions of these dyes until decolorized with such reagents as hydrogen peroxide or ammonium persulfate.

Though light serves as an agent for the destruction of dyestuffs, it may also be utilized to produce certain dyes from colorless substances. Diazo compounds combined with sodium sulfite (diazosulfites) do not yield azoic colors when mixed with amines or phenols, but produce such azoic compounds when light radiations have broken down the diazosulfite and regenerated the diazo compounds. Leuco-bases of triphenylmethane have their original color regenerated under the influence of light, in the same manner as results from the use of an oxidizing agent.

In general, it may be said that the action of light upon dyestuffs is very complex, differing with the structure of the individual dye, and producing varied decomposition products for whose nature no definite law can be formulated.

Army Uniform Fabrics Containing Cellulose Acetate

(*F. Deshayes—R. G. Mat. Col.,* 517-51, *Feb.,* 1940).—It had become a matter of economic importance to France to produce a military uniform cloth in which a significant fraction of the wool was replaced by an artificial fiber of domestic manufacture, but which possessed properties corresponding closely to those of an all-wool fabric. After considerable experimenting, cellulose acetate was selected as the material best suited for this purpose. These fibers possess some resistance to water, and their thermal conductivity approaches quite closely to that of wool.

One of the requirements specified by the authorities for a fabric of this type was that it should be able to resist for 24 hours a "pocket" of water 10 centimeters in depth. Such a test the author considers not particularly well chosen, as the weight of water in a small pocket tends to stretch and separate the threads, so that the elasticity desirable in a fabric of this nature may here place it at a disadvantage. He advocates instead a test in which the entire surface of a cloth sample is subjected to a uniform water pressure, a method by which the time of penetra-

tion by water may be recorded, and the uniformity of penetration observed.

The first experiments in which Rhodiaceta fibers were mixed with wool for the manufacture of uniform fabrics gave very satisfactory results from the standpoint of resistance tests, the cloth frequently exceeding by an ample margin the required minimum. In carbonizing, however, it was found that the acetate fibers could not withstand the action of sulfuric acid, and it was necessary to employ for this purpose the aluminum chloride process, one which they could successfully resist.

It was at first supposed that the presence of acetate fibers would aid the water repelling properties of the fabric, and also that the aluminum chloride carbonization process, by deposition of aluminum hydroxide, would contribute to the same effect. In practice, however, this did not prove to be the case, and to secure the desired result it was found necessary to treat the fibers with an insoluble aluminum or calcium soap, prior to carbonization.

A general course of treatment is recommended to secure a satisfactory degree of water-repellency for such fabrics. This includes passage through a soap bath of such concentration that after extraction the quantity of fixed fatty acid will amount to approximately 0.22 per cent on the weight of the goods; then passage through a bath containing an excess of soluble salts of aluminum or calcium; next, carbonization at a temperature between 120° C. and 130° C, and finally a thorough rinse in water.

New Problems in Dyeing

(*L. Bonnet—R. G. Mat. Col.*, 517-53, *Feb.*, 1940).—The specialized knowledge that is required of the modern dyer is far more extensive than was necessary a half-century ago. To the classical fibers have been added the various rayons, to be followed more recently by fibers of purely synthetic origin. With the purpose of obtaining very close substitutes for wool and silk, new types have been brought forth—casein fibers, regenerated fibroin, fiber spun from synthesized amino acids of diverse categories of resins. There have appeared protenized and basified rayons, and of late there has even been talk of fibers made from glass. From all these sources the dyer is confronted with a maze of problems, of a complexity which could scarcely have been foreseen. Nor is the part of the finisher much easier, especially as some of the new protein and polymerized compound fibers are highly thermoplastic and may suffer irremediable damage from the action of heat.

Of all the various fibers produced as substitutes for wool, none succeeds in imitating it perfectly, either from the chemical, physical or textile standpoint. It thus appears that these fibers will not usually be employed to replace wool outright, but will rather find use in combination with it, sometimes along with cotton or cellulose rayon, for the manufacture of special fabrics or for reasons of price. In such circumstances the difficulties of dyeing become clearly evident. The cotton or wool in such mixtures may have had its original properties altered by pre-treatments such as immunization of the cotton or chlorination of the wool; the casein or protein treated fibers, the polymerized resins, regenerated celluloses, cellulose esters—all may behave differently in dyeing in accordance with their particular processes of manufacture. Added to this is the part played by structural variations of the polymerized compounds, as in the enormous molecules of the methylacrylate resins, and it becomes apparent that, though contrasting effects may be readily secured, the problem to the dyer of producing uniform shades on mixed yarns and mixed fabrics of such description amounts to a veritable Chinese puzzle.

Under such conditions the value of laboratory trials before processing fabric in bulk is hardly open to question. Where diverse materials are concerned, it is necessary to determine in advance their various dyeing properties and the conditions which best suit all fibers present. The fastness of dyeings to light, washing and the like needs to be determined by comparative trials on the various fibers.

As illustrations of the artificial laniform fibers, used some times without admixture for special fabrics, may be mentioned Lanital (pure casein), Fibramine and Cisalpha (viscose containing casein) and Artiliana (urea resin). Lanova, a mixed thread of wool and Lanital, is now met with in commerce, as are mixtures of Artiliana, of Cisalpha and of Fibramine with wool. The "Zellwollen" or "cellulosic wool" fibers, such as Fibro, Lanusa and Vistra, are also used in mixture with wool, making it possible in their case to obtain striking two-color dyeing effects.

The all-casein fibers, such as Lanital and Lactofil, dye with wool colors. They have greater affinity than wool for acid colors dyed in a neutral bath, and for most of the direct colors as well. Improvements made in the manufacture of Lanital will now permit it to be dyed with colors requiring considerable acid, such as the Neolans and Palatines, though it is generally safer to use ammonium salts, which liberate acid progressively. This modern Lanital will withstand bichromate treatment after chrome color dyeing, though the metachrome process is no doubt safer. It will also permit accompanying cotton or viscose to be dyed with sulfur colors if an adequate amount of sodium bicarbonate is added to buffer the alkaline sodium sulfide, and may also be dyed with vat colors by the recommended "Helindone" process.

Fibers of regenerated cellulose containing dispersed proteins, such as Cisalpha and Fibramine, dye like cotton, and even more strongly. Because of the presence of protein these will also dye with wool colors, though not so deeply nor so fast as wool itself. Thus fabrics of wool mixed with Cisalpha or Fibramine may be dyed like fabrics of wool-viscose.

Viscose fibers containing dispersed resins, such as urea-formaldehyde, show dyeing affinities varying between those of wool and of viscose. Rayolanda, for example, dyes even

more deeply than cotton. Acid and chrome colors, however, can generally be employed, depending on the materials.

The synthetic fibers, polyamides, polyvinyls and the like, may be dyed with acid and chrome colors, as well as with the cellulose acetate dyes. Some of these possess no affinity for direct colors.

It may again be emphasized that trials in miniature should be made on all such yarns or fabrics before undertaking large-scale dyeing.

"Practical Hints"

R. G. Mat. Col., 267—VII, February, 1940.—Determination of Manganese: Gravimetric determination of small amounts of manganese in a compound is rarely exact, due to the difficulty in securing complete separation of the manganese. It is generally possible, however, to determine the manganese in a separate portion of the material by a colorimetric method. This is based upon the conversion of the manganese into permanganate by action of a suitable oxidant, for which purpose potassium periodate has been found most satisfactory.

To Clean Leather, Retaining Its Flexibility: A mixture is made of 6 parts of Castile soap and 160 parts of water. Boil to solution, cool, and add

Glycerine	14 parts
Aqua ammonia	6 parts
Ethylene dichloride	7 parts

Origin of "Khaki": Khaki was originally worn by the Mohammedans who formed part of the Queen's Guides, an organization which operated in 1830 against the Sikhs. Possessing no regular uniforms, the native soldiers stained their ordinary clothes somewhere between gray and grayish-brown in color with dye obtained from the juice of a shrub resembling the nain-palm. The advantage of this protective coloration was demonstrated to the British authorities by the fact that losses sustained by the scarlet uniformed regulars among the defiles of North Hindustan were far heavier than those suffered by their khaki-clad native auxiliaries. In the Urdu tongue the word is said to signify "extremely dirty."

To Repolish Rusted Nickel Ware: A polishing paste is prepared as follows:

Nickel Chloride	114.0 gr.
Powdered Lime	57.0
Zinc White	57.0
Glycerine	3.5
Aqua Ammonia	14.0
Water	42.5

The paste is applied directly to the metallic surface.

TRADE NOTES • NEW PRODUCTS

• HOOKER APPOINTMENT

Hooker Electrochemical Company announces the appointment of Roderick M. Ladd to its sales staff. Mr. Ladd will be engaged in promoting the sale of the general line of Hooker Chemicals for Industry in the Metropolitan New York area.

• NIXON ELECTED VICE PRESIDENT

The resignation of G. G. Rheuby, vice president and director of Hercules Powder Company, from the Executive Committee, was announced recently by C. A. Higgins, president, following the regular monthly meeting of the Board of Directors. A. B. Nixon, director and formerly general manager of the company's Naval Stores Department, was elected a vice president and a member of the Executive Committee, filling the committee positio. vacated by Judge Rheuby. A. E. Forster, assistant general manager, Naval Stores Department, was appointed general manager, succeeding Mr. Nixon.

• STEIN, HALL APPOINTMENTS

Stein, Hall & Co., Inc., manufacturers and distributors of starches, gums and dextrines, have announced the retirement of William A. Boyd as manager of their Providence branch office, and the appointment of Joseph A. King as his successor. During his 37 years of service with Stein-Hall, Mr. Boyd has made a host of friends who will join the company in wishing for him a long period of peaceful retirement.

Mr. King has been associated with the Providence Office for several years. Soon after his appointment as manager he suffered a serious illness but is now on the road to recovery.

Jesse Fraser, formerly connected with several important New England finishing plants, has joined the Providence sales staff. His many years of practical experience enable him to be of great help to textile plants.

William S. Newell has been transferred from the Providence Office to cover the Maine territory under the direction of R. D. Armstrong, Boston branch manager. George H. Norton has taken over most of the textile territory Mr. Newell formerly covered out of Providence.

For years the Providence Office has attracted textile plant men because of its laboratory services. The laboratory is in charge of Fred G. La Piana, assisted by Herman S. Bosland, George N. Houth, and Leonard F. Costello. The office staff is in charge of Mrs. Ellen C. Hogan, assisted by Miss Doris W. Lennon.

• CALCO RELEASE

Outstanding light fastness for an acid green is said to be the important advantage of Calcocid Alizarine Green CGW, a dyestuff currently being featured in a special bulletin, distributed by the Calco Chemical Division, American Cyanamid Company.

It is stated that dyers of sweater, carpet and weaving yarns will be interested in the properties of this dye, particularly in regard to washing and fulling. Calco's Alizarine Green CGW is said to be exceptionally good to washing and very good to fulling.

According to this folder, dyers seeking a neutral dye similar to Alizarine Green CGW may obtain these same fastness properties from Calcocid Alizarine Green CGN Extra. The neutral property of this dyestuff makes it valuable for use with union materials.

As with the others in the Calco series of color announcements, this one describing Alizarine Green CGW and CGN Extra is designed to fit in a standard sized file cabinet. It is also equipped with a

convenient reference tab indicating the color and type of dye described in the folder.

• ALIEN REGISTRATION

As part of the National Defense program, a nationwide registration of aliens will be conducted from August 27 through December 26, 1940, by the Immigration and Naturalization Service of the Department of Justice. Registration will take place in the post offices of the nation. It is expected that more than three and one-half million aliens will be registered during the four-month period.

Registration is made compulsory by a specific act of Congress, the Alien Registration Act of 1940, which requires all non-citizens to register during the four-month official registration period. The law requires that all aliens 14 years or older are to be registered and fingerprinted. Alien children under 14 years of age will be registered by their parents or guardians. When alien children reach their fourteenth birthday, they will be required to register in person and be fingerprinted.

A fine of $1,000 and imprisonment of six months is prescribed by the Alien Registration Act for failure to register, for refusal to be fingerprinted, or for making registration statements known to be false.

As part of its educational program to acquaint non-citizens with the registration requirements, the Alien Registration Division is distributing more than five million specimen forms listing the questions that will be asked of aliens at registration time. Besides the usual questions for establishing identification, the questionnaire asks the alien to tell how and when he entered the country, the method of transportation he used to get here, the name of the vessel on which he arrived.

He is also asked to state the length of time he has been in this country and the length of time he expects to stay. He must also describe any military or naval service he has had, and list the names of any organizations, clubs, or societies in which he participates or holds membership. In addition, he is required to describe his activities in any organization, and to affirm whether or not the organization furthers the interests or program of a foreign government.

To make their registration easier, aliens are being asked to fill out sample forms, which will be available prior to registration, and take them to post offices where they will be registered and fingerprinted. Every registered alien will receive by mail a receipt card which serves as evidence of his registration. Following registration, the Act requires all aliens, as well as parents or guardians of alien children, to report changes of residence address within five days of the change.

The Alien Registration Act was passed so that the United States Government may determine exactly how many aliens there are, who they are, and where they are. Both President Roosevelt and Solicitor General Biddle have pointed out that registration and fingerprinting will not be harmful to law-abiding aliens. The Act provides that all records be kept secret and confidential. They will be available only to persons approved by the Attorney General of the United States.

Fingerprinting of aliens carries no stigma whatsoever. Thousands of citizens are voluntarily fingerprinted every year. Members of the United States Army and Navy are all fingerprinted, as are many Government workers. In recent years, many hospitals have established the practice of taking footprints of newly-born babies. Because fingerprinting is the only infallible method of accurate identification, the United States Government has adopted it as part of its registration program.

The Immigration and Naturalization Service asks for the co-operation of all citizens in carrying out the Alien Registration program in a friendly manner so that our large foreign population is not antagonized. It is suggested that citizens may be of great help to their non-citizen neighbors or relatives by explaining to those who do not speak English well what the registration is, where aliens go to register, and what information they must give.

The Registration of Aliens program has been set up as a separate division of the Immigration and Naturalization Service. The program is being directed by Earl G. Harrison, under the general supervision of Major L. B. Schofield, Special Assistant to the Attorney General.

• PHOENIX RELEASES

Phoenix Color & Chemical Co., 24 Van Houten St., Paterson, N. J., announces release of the following new products:

Benzaphen Diazo Blue N A F—a new direct dyeing navy which is said to be rendered very fast when diazotized and developed in the regular way with beta naphthol. It is highly recommended by the manufacturers for printing, when a pure white is required. When dyed on cotton yarn it is said to be exceptionally bright, therefore offering a much larger range of shades. It is stated that its all around fastness properties, especially washing, are very good.

Benzaphen Fast Red 8 *B L* (C. I. 278)—said to have excellent light fastness and dischargeability, moderate wash fastness and to leave acetate rayon white. The solubility, penetration and leveling properties are said to be excellent.

Benzaphen Fast Red F (C. I. 419)—is said to have good light fastness and moderate wash fastness. The solubility, penetration and leveling properties are said to be excellent.

• CHEMICAL IMPORTS AND EXPORTS

Imports

Notwithstanding disturbed conditions in a number of primary foreign markets imports of chemicals and related materials into the United States were well maintained during the first half of the current year with many of the items entering into the trade recording substantial increases compared with 1939, according to C. C. Concannon, Chief of the Commerce Department's Chemical Division. Higher price levels are reflected throughout the entire list, he stated.

The value of chemical and related product imports in the first half of the current year was recorded at $87,982,000 against $90,407,653 in the corresponding months of 1939, preliminary statistics show.

Marked increases were recorded in receipts of crude and semi-processed materials in the drying oil, gum, wax and drug fields, while imports of certain types of fertilizers, dyes and medicinal fish oils decreased.

Exports

United States exports of chemicals and related products during the first half of the current year were valued at $128,361,000, a 55 per cent gain over the $82,825,000 trade recorded in the corresponding months of 1939, according to C. C. Concannon, Chief of the Commerce Department's Chemical Division.

Since the outbreak of hostilities in Europe foreign demand for practically all types of American chemical products has been increasing steadily. In June of the current year exports of such products reached the record value of $26,000,000 which was double the value of shipments in the corresponding month of last year and the highest figure recorded in many years.

While some of the warring nations have been purchasing larger quantities of American chemicals, the over-all increase in exports of such products has been due very largely to heavier demand from areas remote from the war zones, Mr. Concannon pointed out. Shipments to countries of Latin and North America have been especially heavy in recent months, and substantially larger quantities have been going forward to countries of Asia, Africa, Australia, and elsewhere.

While exports of practically all types of American chemical products have increased substantially, demand in the first

half of the current year was especially keen for coal-tar dyes, medicinals, industrial chemicals, explosives, and other miscellaneous products of lesser importance.

Exports of all types of coal-tar products, including dyes were valued at $15,000,000 in the first half year compared with $6,318,000 in the corresponding months of 1939. In this group, shipments of dyes increased in quantity from 5,000,000 to 15,000,000 pounds during these periods and the value advanced from $2,215,000 to $7,070,000.

• ANNUAL SILK PARADE

The seventh annual Silk Parade, a nation-wide, store-wide promotion of quality silks and silk merchandise will be celebrated in 10,000 stores from coast to coast the week of September 23rd. At that time approximately twenty-five departments in the average store featuring more than sixty items of silk merchandise will co-ordinate Silk Parade advertising, displays and promotion.

• QUAKER LABORATORY

The Quaker Chemical Products Corporation of Conshohocken, Pa., has broken ground for a new laboratory. The construction is to be of all brick and concrete throughout. It has been designed and is being constructed by Frank R. Heavner.

Plans for this laboratory call for the accommodation of fifteen research chemists and has been designed purely for research and development work. The old laboratory will continue to be used for control and plant work. The design of the laboratory includes division for stock room, sample room, rest room and reading room, with almost 70 per cent glass area around the building for excellent lighting.

Construction began on August 1st and it is expected the laboratory will be ready for occupancy by October 1st.

• NEW CONDITIONING ROOM

The United States Testing Company has just completed installation of a new standard temperature and humidity controlled conditioning room at its Southern Testing House in Greensboro.

All materials should be tested in a standard atmosphere of 70° F. and 65 per cent relative humidity. Summer heat and humidity make it impossible to maintain standard conditions without complete up-to-the-minute conditioning equipment.

The new conditioning room is insulated with 1½-inch thick Vapor Sealed Celotex and illuminated with the new fluorescent lights. Parks Cramer Company installed air conditioning and dehumidifying equipment. The room will be controlled in accordance with A.S.T.M. requirements for standard atmosphere.

The United States Testing Company has issued an invitation to all Southern Mills to inspect the new equipment at the Southern Testing House, 1200 Arlington St., Greensboro, N. C.

• OPEN FORUM •

Rules under which this department of the REPORTER is conducted are as follows:

1. Anyone who has a technical problem on which he would like advice may submit it to the Reporter and it will be published in the first available issue.

2. Any reader who feels that he has a solution of the problem may forward his reply to us and if we feel that the reply is suitable it will be published in a succeeding issue.

3. For each such reply published the Reporter will pay a minimum of $2.

4. In case there is more than one answer to the same question, the one covering the subject in the most complete and authentic manner will be published, or if two answers are sufficiently different both will be published. If two answers are considered equally good, the one first received will be given priority.

5. The Reporter will assume no responsibility whatsoever for the accuracy of the answers submitted—it is simply offering a vehicle for the public expression of its readers' opinions.

6. Both the questioner and answerer must send in his complete name and address. When requested we will publish only the initials or other identifying insignia.

Question

52—We are dyeing and finishing gabardines containing 15 per cent wool and 85 per cent rayon in the warp, while the filling is 100 per cent cotton and have considerable trouble with streaky shades warp wise on the face when dyed in tan shades.

It is possible that some of the readers of the OPEN FORUM may have suggestions regarding this difficulty.—**T. M. A.**

• CLASSIFIED ADVERTISEMENTS •

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

SALESMEN WANTED:
with pleasing personality—for textile oils, specialties and dyestuffs. Must have following and possess practical knowledge of dyeing and finishing. Salary and traveling expenses or commission. Territory available in the South, New England, Pennsylvania, New York and New Jersey. Write Box No. 254, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

POSITION WANTED: Chemist, rayon processing man, sixteen years experience with leading organizations. Can supervise the dyeing and finishing of rayon, acetate, cotton fabrics, the chemical control, economy, research, improvements. Write Box No. 255, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

Use Reporter Classified Advertisements for Results!